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NASA'S NEW TECHNOLOGY REPORTING SYSTEM: A REVIEW AND FUTURE PROSPECTS

by

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FOREWORD

This report represents a systematic effort to describe how NASA's new technology reporting system operates today, and how that system might be enhanced. Although the system has run for more than two decades, it is not well documented in terms of organization, operational practices, or other program benchmarks.

The study seeks to identify and assess incentives or disincentives to reporting, program management, program follow through, and the feasibility of various means for improving the general process. Initially, it was hoped that the study team might uncover the kind of information that would permit the determination of some "average" sequence of events (or a time line) from the point of identifying a solution to technical "need" to the point where its solution was actually reported to NASA. Information regarding this objective proved to be too elusive, primarily because early probes revealed that contractor awareness of the new technology requirements generally was too poor to provide useful information.

The report that follows is based primarily upon documents furnished by NASA Headquarters, by Field Center technology utilization officers, and interviews with persons knowledgeable about the system. Visits were made to seven Field Centers: Ames Research Center, Goddard Space Flight Center, Jet Propulsion Laboratory, Johnson Space Center, Langley Research Center, Lewis Research Center, and Marshall Space Flight Center. Other documents were furnished by officials of major aerospace corporations.

Detailed interviews were conducted with Field Center technology utilization officials, project engineers or scientists, patent counsels, and other Field Center officials who had knowledge about the new technology reporting system. Interviews also were conducted with knowledgeable officials from a number of the primary aerospace companies. Numeric data was obtained from regular NASA reports, from original sources such as NASA Tech Briefs, or from contractor reports.

I am indebted to dozens of persons in both NASA and industry who took time to assist in the data collection by being interviewed, and through answering follow up questions on the telephone. Individuals interviewed and their affiliations are shown in Appendix A. I am most grateful to them for their kind assistance. A note of thanks is due to the other members of the DRI study team: Jody Briles, Kathy Hirst, and Joel Johnson. The responsibility for this report, its accuracy, and the nature of the observations and conclusions rest solely with the author.* Text or citations in the numbered footnotes are to be found at the end of each chapter.

Richard L. Chapman
Study Director

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CHAPTER 1
PURPOSE AND VALUE OF THE NEW TECHNOLOGY REPORTING SYSTEM

The fundamental purpose of NASA's new technology reporting system is, perhaps, best stated in the most recent version of NASA's procurement regulations.

> The objectives of NASA policy. . . . are to obtain the prompt reporting of inventions, discoveries, improvements, and innovations made in the performance of any work thereunder (whether or not patentable) in order to protect the Government's interest therein and to provide the widest practicable and appropriate dissemination, early utilization, expeditious development, and continued availability thereof for the benefit of the scientific, industrial, and commercial communities and the general public.[1]

Basic Requirements of the Program

The new technology reporting system is an integral part of NASA's Technology Utilization program. As such, its charter derives from two sources of authority in NASA's founding act, the National Aeronautics and Space Act of 1958 (as amended).[2] First, is the basic responsibility for a continuing program in the transfer of technology found in Section 203(a)(3):

> The Administration in order to carry out other purposes of this Act, shall—
> (3) provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.[3]

Although Section 203(a)(3) provides the basic charter for NASA's technology utilization efforts, the New Technology Reporting requirement is more specifically located in the section dealing with property rights and inventions, Section 305(b):

> Each contract entered into by the Administrator with any party for the performance of any work shall contain effective provisions under which such parties shall furnish promptly to the Administrator a written report containing full and complete and technical information concerning any invention, discovery, improvement, or innovation which may be made in the performance of any such work.[4]

Recent changes in the patent law (PL 96-517) and some that are anticipated may have a substantial effect upon this Section 305 basis for new technology reporting. This will be described in detail later.

NASA procurement regulations more specifically delineate the nature and requirements of NASA's new technology reporting system. Two elements are particularly important: (1) what constitutes a "reportable item," as it defines the nature of what must be reported into the system; and, (2) establishing minimum procedures which any contractor is to follow to assure that the appropriate items are reported. NASA's procurement regulations characterize the term "reportable item," as:

> . . . . means any invention, discovery, improvement, or innovation of the contractor, whether or not the same is or may be patentable or otherwise protectable under Title 35 of the United States Code, conceived or first actually reduced to practice in the performance of any work under any NASA contract or in the performance of any work that is reimbursable under any clause in any NASA contract providing for reimbursment of costs incurred prior to the effective date of the contract.[5]

Basically, NASA contractors are required to designate an official, acting under the contract, to be responsible for the new technology reporting function on that particular contract. In addition the contractor is required to have an "active and effective" set of procedures to assure that reportable items are promptly identified, documented and reported to NASA. Such reports are to be made shortly after the invention or the innovation is first made, or at a minimum on an annual basis. Failure to meet these reporting requirements can result in withholding of payment to the contractor in the amount of $50,000 or five percent of the total contract cost, whichever is less.[6]

General Program Results

Program results can be judged by several different measures. First, in the 20-year period from 1964 through 1984 over 46,000 new technology reports

were entered into the system, approximately 80 percent of these being made by NASA contractors, as contrasted with NASA in-house labs.[7] From the time that NASA Tech Briefs has been published (1976) any given issue will carry approximately 120-140 Tech Briefs, so that approximately 30 to 40 percent of all new technologies reported culminate in publication in the journal.

Second, during the same 20-year period NASA has received more than one and a quarter million requests from industry, universities and individuals for further data regarding items published in NASA Tech Briefs.[8] These are requests for "Technology Support Packages," which provide more detailed information about the particular innovation than appeared in the journal.

In addition, more than 400,000 other requests have poured into NASA related to technology utilization activities--the vast bulk of these apparently stimulated by the dissemination of information made possible by a new technology reporting system.

Finally, in 1977 the Denver Research Institute completed a study on the costs and benefits related to the publication of NASA Tech Briefs. The study revealed net annual benefits, primarily to U.S. industry, of $65 million (or approximately $102 million in 1983 dollar measurements).[9]

One can reasonably conclude that the new technology reporting structure of NASA provides an important basis for access to and the basic distribution of new technology information to a wide variety of "secondary users." The data also suggests that this system provides substantial benefits to the American economy in terms of real value, beyond that of expanding technical communications.

CHAPTER 1 FOOTNOTES

1. NASA Federal Acquisition Regulations, Supplemental Directive (April 1, 1984) Subpart 18-27.372 Policy.

2. PL 85-568; 72STAT.426.

3. Section 203(a)(3) National Aeronautics and Space Act of 1958 (42 U.S.C. 2473).

4. Section 305(b) National Aeronautics and Space Act of 1958 as amended (42 U.S.C. 2457).

5. NASA Federal Acquisition Regulations, Supplemental Directive, (April 1, 1984), Subpart 18-27.371 Definitions.

6. Ibid. See Subsection 18-27.373(e) and Subsection 18-27.375-2.

7. See Appendix C, Table 1 "Technology Utilization New Technology Reporting 1964-84."

8. See Appendix C, Table 2 "Technology Utilization Program Inquiries."

9. NASA Tech Brief Program Cost Benefit Evaluation, Denver Research Institute, May 1977, p. 40.

CHAPTER 2
THE SYSTEM IN CONCEPT AND PRACTICE

In considering the new technology reporting system, one must keep in mind several factors which influenced its design and affect how the system currently operates. First, its primary purpose is to identify, and then capture by a documenting process, new technology as it is being first produced, in a particular NASA project or program. The ultimate purpose is to make widely available information about such new technological innovations so that others (particularly those outside the aerospace industry) are encouraged to make use of such technology for their own purposes--whether these be private or public organizations.

Second, the system is directed both at NASA contractors and at NASA in-house laboratories. Since there is less management leverage over contractor reporting (and most research and development funds are spent outside NASA laboratories), a fundamental challenge has been to find means to stimulate reporting of new technology from contractors.

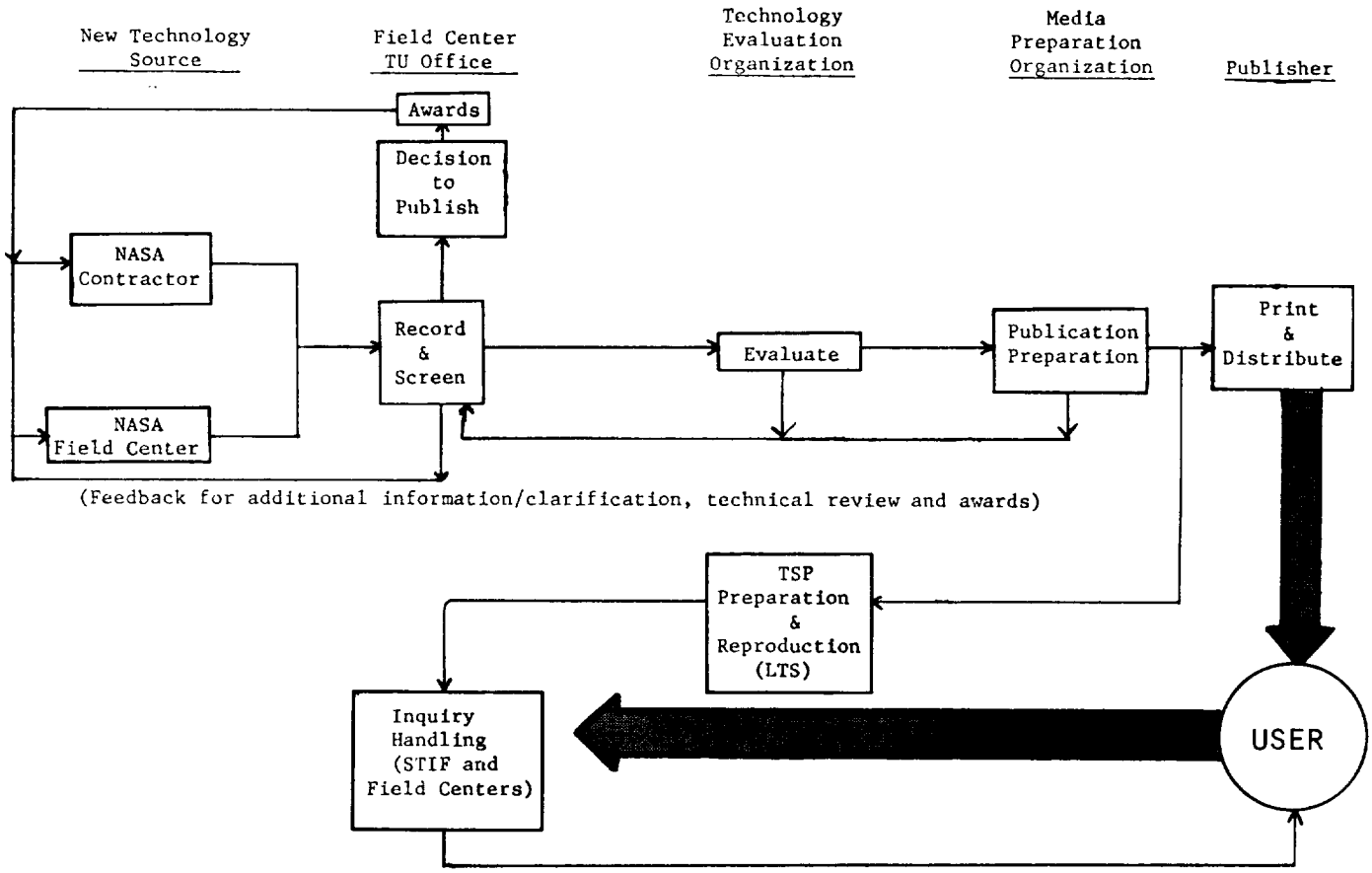
Third, since the value of "new technology" tends to deteriorate with time, it is particularly important that the system facilitate rapid reporting and movement of the information to the potential user.

Fourth, since the primary interest is in "secondary" use of this technology, the potential clientele is extremely broad--not limited to aerospace companies, but conceivably to any domestic organization that can put technology to effective use.

The New Technology Reporting System

Figure 1, below, graphically illustrates the basic sequence of reporting a new technology item from its point of origin through publication and user inquiry.*

Figure 1
NEW TECHNOLOGY REPORTING AND PUBLICATION SYSTEM



*Note should be taken of the unique position of the Jet Propulsion Laboratory (JPL). It is a contractor operated facility for NASA by the California Institute of Technology. It operates much like and is treated as a NASA Field Center. However, data on its operations are presented like that of a regular contractor, not as a NASA Field Center, and this is reflected in data tables throughout this report.

Shortly after first producing an innovation, the initiator (contractor or government employee) completes a brief, descriptive report to NASA. An optional reporting form, NASA Form 666A is available for this purpose. This report probably will be reviewed by an immediate supervisor and forwarded via the organization's New Technology Representative to the Technology Utilization Office at the cognizant NASA Field Center. At the Field Center it will be entered into the reporting system, screened for patent potential, and evaluated as to whether it has sufficient promise for other applications to warrant publication. The Field Center generally will seek an independent evaluation from its evaluation contractor, SRI International's Technology and Innovation Management Center.

Once it is determined that the item is worthy of publication, the Field Center of origin forwards the draft material to Logical Technical Services (LTS) for final preparation to publish. Concurrently the Field Center will prepare a request for the Tech Brief recognition award of $100 to be given to the originator of the innovation.

Beginning in 1985, publication and distribution of NASA Tech Briefs is being handled by Associated Business Publications. Before that NASA published NASA Tech Briefs, with printing handled by the Government Printing Office and distribution by NASA's Scientific and Technical Information Facility. NASA Tech Briefs are issued on a quarterly basis.

Each issue of NASA Tech Briefs carries reader cards by which Technical Support Packages (TSPs), when available, can be requested by readers to obtain more detailed information regarding the innovation as published. Reader card requests are returned to NASA's Scientific and Technical Information Facility, (STIF), Technology Transfer Division for reply and provision of available TSPs. However, since the name of the innovator and the cognizant Field Center or company affiliation are included with the NASA Tech Brief item, the Field

Center TUO or technical division may be contacted directly by the reader. Ultimately, each innovator (whether NASA contractor or NASA employee) is recognized by presentation of a certificate and $100 Tech Brief award.

The New Technology Reporting System can be understood better by reviewing the five principal processes in this system: (1) generating/stimulating the report; (2) report evaluation; (3) preparation for publication; (4) distribution and follow-up; and, (5) recognition via awards. Note that the NASA Field Center plays a central role throughout this system.

Generating or Stimulating the Report

The basic responsibilities for NASA contractors with respect to new technology reporting are spelled out in the NASA Procurement Regulations.[1]

The contractor is required to establish and maintain a system that will ensure that "reportable items" are identified and reported in a prompt manner. Usually, the contractor is expected to have a set of written procedures. In larger contracts, such as those of $2.5 million or more, the contractor is expected to present a new technology reporting plan at the time of the procurement. The contractor is required to furnish a complete report for each "reportable item" within six months after conception or first actual reduction to practice, whichever occurs first. Notwithstanding this time span, the contractor is expected to report to NASA such new technology before it is made available for sale, public use, or disclosed by publication. Apart from these individual reports on each "reportable item," a contractor is to submit interim reports annually, and then, within three months after completion of the full contract work.

The contractor agrees to furnish additional information, beyond that in the original report on the particular item, as NASA may have need in its

preparation of a patent application or its program to facilitate dissemination; and the contractor also gives the government permission to duplicate and disclose information from its new technology reports as part of its process of disseminating new technology.

In order to provide a central point of focus on the longer contracts, NASA requires the contractor to designate a person in the contractor's specific project or program who will be responsible for the new technology reporting function and with whom the NASA new technology representative in the Technology Utilization Office of the Field Center responsible for the contract can have regular communication and interaction. In practice, the person so designated will vary considerably. Key factors are the size of the project, the emphasis placed upon the new technology reporting function by the NASA personnel responsible for both the technical and administrative aspects of the contract, and the extent to which the contractor has had a continuing relationship with NASA. Project managers or chief engineers frequently are designated as the contractor's new technology reporting representative. It is not unusual for the contractor's patent attorney or contract officer to be designated to administer this function.

During the early years when the system was put into place, NASA Headquarters expended considerable effort to promote reporting through the development of educational material, standard reporting forms, handbooks, orientation briefings and site visits by which to provide guidance to contractor personnel. In the late 1960s, it was not unusual for senior NASA Headquarters officials, during visits to major contractors, to specifically address the need for special efforts on the part of the contractor to facilitate reporting of new technology and thereby aid the broader technology utilization efforts by NASA.

NASA Form 666A was made available in April 1969 as a convenient means to encourage reporting. It briefly outlined four areas of desirable information: (1) a description of the problem that motivated the technology development; (2) a technically complete and easily understandable description of the new technology that was developed to solve the problem or meet the objectives; (3) the unique or novel features of the technology and the results or benefits of this application; and, (4) the listing of pertinent documentation or references which would aid another person in understanding or applying the new technology.[2]

At this same time NASA published a brief handbook titled "Documentation Guidelines for New Technology Reporting," NHB 2170.3, April 1969. The handbook described the purpose and value of the NASA technology utilization program and the important part that new technology reporting played in that program. It then proceeded to describe in detail the various criteria used to document a "reportable item," with a wide variety of examples of what would constitute a "reportable item," and the kinds of contexts in which they might be found. The handbook illustrated a step-by-step process of how a report could be written, with samples of some of the better documentation that had been received by NASA Technology Utilization officers under the reporting program.

The new technology reporting form (NASA Form 666A) is still available and issued by Field Centers to provide guidance to contractors, although the actual reports sent in from contractors rarely are submitted on this form. The April 1969 edition of the handbook is no longer in print and is considered obsolete by those managing the NASA directives system.

The NASA Field Center is the heart of the new technology reporting system. Typically, a staff member of the Technology Utilization Office (TUO) at

the Field Center is designated as being responsible for monitoring new technology reporting at the Center. This person then bears the responsibility for promotion, monitoring, and follow-up activities related to new technology reporting. During the earlier years of the TU program, it was not unusual for the new technology representative, often accompanied by other Field Center representatives, to visit principal contractors as part of the orientation and promotion process. From time to time orientation sessions would be conducted at the Field Center or some other central location to provide more detailed information about the system and guidance on how to stimulate the highest quality reporting.

As travel funds and staff positions for technology utilization activities have declined, there has been a noticeable decline in this type of "promotion" activity. The new technology representative may initiate the process whereby letters outlining the program and responsibilities for new technology reporting are sent to appropriate contractor personnel at the beginning of a new contract. This may or may not be accompanied by the distribution of illustrative material.

The Field Center new technology reporting representative has many bases to touch in the process of monitoring and following up on <u>both</u> contractor and in-house reporting. Usually, there is close cooperation between the Technology Utilization Office and the Field Center patent attorney on reports of new innovations or patentable items. This liaison prevents premature disclosure as well as providing up to date information of patent status on new technology items.

The Field Center new technology representative frequently is in contact with colleagues in the other technical divisions within the Center who are the

technical monitors or "contract officer representatives" reviewing the substance and technical aspects of the Center's contracts. The technical monitors remain in close touch with the particular projects over which they have technical oversight, and are excellent sources for both encouraging the reporting of new technology and for identifying new technology advances that may have been overlooked or should be reported.

Other means for assuring more complete coverage are "tickler" notices that will be sent out by the contract office to the contractor reminding them to fulfill their NTR requirements, as well as requests that contractor personnel may send to the technical monitor or contract officer to review and approve the writing of articles for professional journals or the presentation of papers. Such articles and papers can be excellent sources for the identification of new technology.

The Field Center new technology representative often has an informal liaison with key persons in the technical divisions of the Field Center for the purpose of identifying possible activities for inclusion in new technology reporting <u>within</u> the Field Center. As is the case with contractors, the new technology representative will also be alert to articles or papers presented by Field Center scientists or engineers as sources of new technology items.

Usually, the new technology representative will have access to copies of technical reports furnished by contractors or completed within the Field Center laboratories, providing another opportunity to review source material for potential reportable items.

There is a notable exception to the general structure of the new technology reporting system that will be described in greater detail later but will be mentioned briefly because of its importance to generating new technology reporting among contractors. That is the Johnson Space Center's contract with

Rockwell International which specifically provides for a technology utilization group within Rockwell's Space Transportation Systems Division. This was first initiated in 1965 on work related to the Apollo, and was continued through the Saturn S-II, Apollo-Soyuz, Skylab, and now the Shuttle prime contracts. It was recognized by NASA managers (particularly by Johnson Space Center's Patent Counsel, Marvin F. Matthews) that a large program under a single prime contract such as these programs represented, could easily "mask" considerable new technology that would be discovered and applied by subcontractors under the prime contractor. Even though a prime contractor is required to include the new technology reporting clause in contracts with other suppliers, there was no effective means to leverage reporting by the subcontractor. In all other cases, the prime contractor is required only to report to the NASA Field Center responsible for the contract that a subcontract has been let to the particular organization and that the requisite new technology reporting clause has been included in that particular contract.

This special arrangement on the Rockwell contracts provided for their technology utilization group to undertake an active program of orienting senior subcontractor personnel, providing education materials, and encouraging their reporting. This, of course, was also utilized within Rockwell in the Space Transportation Systems Division on the work undertaken by Rockwell itself. The results have been heartening, as 93 subcontractors contributed 1,081 reportable items to NASA in the period September 1972-April 1985.[3]

Report Evaluation

Each report of new technology received at a Field Center is evaluated based on three criteria: (1) novelty, (2) technical significance, and (3) utility or potential for use. As used in this system, novelty means that the innovation reflects a new application or a new design. This can include some

new synthesis of existing technologies. Technical significance relies essentially on expert or peer judgment that the innovation adds to the body of knowledge in the particular subject area or a related area and that this would be so acknowledged by knowledgeable individuals. Utility is judged on the basis of whether or not the innovation has potential usefulness in other settings than the one where it was first applied--usually thought of as having commercial significance, although the application might be in a public organization, such as an agency of the Federal, State, or local governments.

The first determination in this evaluation process usually is made by personnel in the TUO at the Field Center. In some cases, it may be referred to a technical peer elsewhere in the Field Center for further evaluation, or the Field Center TUO may request an evaluation from SRI International's Technology and Innovation Management Center. In the case of SRI evaluation, the report will go through a three step process: (1) screening, (2) preliminary review, and (3) expert evaluation.[4]

Reports received by SRI from the Field Centers are screened for completeness of documentation, recording into their tracking system, and assigned for review. The report is then sent to one of six principal evaluators who is a senior technical person with wide ranging competence across a number of fields. This review is principally to identify any significant problem such as prior art or product safety. Following the preliminary review, the report will be sent to one of several hundred experts at SRI, who are specialists in the particular field, for a more detailed review. This evaluation is documented in a one-page report that includes: a short description of the new technology from the perspective of the evaluator, and a discussion/critique on the novelty, technical significance, and utility of the innovation, along with the recommendation to publish or not publish including a summary of the reasons for the decision. This evaluation is then reported back to the Field

Center of origin. At its discretion, the Field Center may require a more detailed report of the reasons for the SRI conclusions.

If further information is needed by SRI (or the Field Center evaluator), or if the SRI recommendation is not to publish and the Field Center new technology representative is concerned about this decision, an appropriate reply will be sought from the originator of the report. The originator often may receive the results of the evaluation in order to keep him informed of its general status.

Although this procedure is generally followed, feedback is not consistently practiced, depending largely on availability of staff within the TUO. The final decision to publish or not to publish is with the TUO at the Field Center, so that on occasion, an SRI evaluation not to publish might be overruled.

Preparation for Publication

The new technology report, now having successfully completed evaluation for publication, probably has been revised for clarity and is more complete than was the original submission. At this point, depending upon practice at the particular Field Center, a Tech Brief may be drafted, or the new technology report as it then exists, and accompanied by supporting material that has been collected, will be sent to Logical Technical Services (LTS) for final drafting. Whether the material sent to LTS is the supplemented new technology report or a draft Tech Brief, LTS takes this material and recasts it to meet the NASA Tech Briefs format. LTS expends considerable effort at this point in preparing the numerous detailed graphics that are a part of NASA Tech Briefs. Proof copies of this version of the Tech Brief are then referred to the originating Field Center for final technical review and correction. After receiving these corrections, LTS puts all of the material in camera ready copy

for a particular NASA Tech Briefs issue. In the recent past, this process of preparation for publication (that is, the time it takes a particular new technology report to move from being accepted to publish to point of publication) has taken from six months to two years.

Distribution and Follow-Up

At this point the publisher, Associated Business Publications, prints and distributes NASA Tech Briefs. Over the years, NASA has accumulated an active subscriber list of approximately 75,000 scientists, engineers, and businessmen in the U.S. industry. This was the upper circulation limitation placed upon NASA by the Office of Management and Budget in order to hold down the cost of the publication at a time when NASA had the publication printed (with NASA funds) by the Government Printing Office. This required a restricted distribution, principally to engineers, researchers or persons involved in new product development. Requests by an individual or company to be added to the mailing list required return of a "qualification" questionnaire so that NASA could determine whether or not the prospective subscriber met their user requirements. Now, with a private publisher, similar general restrictions apply for those who would receive the publication without cost. "Non-qualified" respondents can receive the publication for an annual subscription price of $50 per year.[5] Under this new arrangement, subscriptions to NASA Tech Briefs have grown to nearly 90,000 readers, and is expected to reach 110,000 to 120,000 subscribers by the end of 1985. By working through a commercial publisher, NASA estimates that as much as $2.0-2.5 million will be saved over the five year agreement. There also are provisions for NASA to share in any surplus income via royalties.

NASA Tech Briefs contains several reader cards by which recipients of the publication can request more information, including TSPs from NASA's Scientific and Technical Information Facility (STIF). Until July, 1984 these

reader requests received by STIF were referred to the originating Field Center for answer (whether it required a TSP or other kind of information). Since that time the TSP and other related supporting material for the NASA Tech Briefs has been centralized at STIF for direct reply. STIF provides feedback to the respective Field Centers regarding information requests via quarterly reports to the Field Centers.

Inquiries, based upon NASA Tech Briefs reader interest continue to be received directly by the Technology Utilization Office at the respective Field Centers. As noted earlier, approximately 25 percent of all inquiries are received directly by the Field Centers. These are written and telephone inquiries, and the replies are both by telephone and letter. The information provided in the Tech Brief relating to the source of information is set up in such a way so that inquiries are most likely to be directed either to STIF or the Technology Utilization Office in the cognizant Field Center. However, NASA contractors and in-house laboratory scientists acknowledge that they occasionally receive direct inquiries from persons interested in their particular innovation as a result of reading NASA Tech Briefs. Such inquiries are not systematically captured in the data that TUOs maintain, principally because it does not always occur to the scientist or engineer involved to inform the TUO or to use the TUO as a point of assistance, contact or screening for such inquiries.

From time to time NASA has undertaken the periodic sampling of requesters to obtain a more comprehensive picture of the use made of information obtained through the Tech Brief route, and to ascertain its relative value.[6]

Awards

As one means of encouraging the reporting of new technology, NASA offers a Tech Brief award to the originators of an innovation which has been selected

for publication in NASA Tech Briefs. This award consists of a certificate and $100 cash, available to both NASA and contractor personnel. This particular award is designed specifically to encourage new technology reporting; however, individuals who qualify for the Tech Brief awards also are eligible for other NASA-sponsored awards.

Under Section 306 of the National Aeronautics and Space Act of 1958, provision is made for recognition of scientific or technical contributions of significant value to the conduct of aeronautic and space activities. This award system is administered by NASA's Inventions and Contributions Board, which upon application, will review a particular innovation to judge its applicability for such recognition, and also to determine the amount of the award. The Space Act permits making cash awards up to $100,000 (per award) on the initiative of the Administrator. To date, the largest award given to a single individual was in the amount of $25,000 to Richard T. Whitcomb of the NASA Langley Research Center for his work on airfoil shapes for flight at subsonic speeds. Among contractors, four employees of John Hopkins University's Applied Physics Lab shared a $15,000 award for their work on a programmable implantable medication system.[7]

Another source of NASA-sponsored awards involves patents. If the reported item is considered patentable, the inventor is entitled to a minimum of a $150 award. In the case of a NASA employee, the award is initiated when NASA officials decide to file a patent application. Where contractor employees are involved, the award is initiated when NASA is notified of the contractor's filing of a patent application. The ICB automatically reviews all patent

award candidates for possible further awards. However, this does not apply to Tech Brief award recipients where a patent filing is not involved.*

In addition to NASA-sponsored awards, companies may offer recognition, as well. For example, Rockwell International offers $100 for each new technology report that is accepted by the Rockwell technology utilization group and forwarded to NASA. Rockwell also will give an employee an award for a patent application: $200 for filing (or $100 each for two or more co-inventors), and $750 if the patent is issued ($300 each for two or more co-inventors).

Discussions with both NASA officials and with aerospace industry officials indicate that the award system is an important element in stimulating the reporting of new technology. Usually, these awards involve a brief presentation ceremony (often with a senior corporate or NASA official presiding), including a framed certificate and usually a picture in the organization's newsletter. Several departments in Rockwell use a special bulletin board to acknowledge Tech Brief award winners. In some instances, Tech Brief award winners may be included in an annual awards or recognition dinner. The combination of peer recognition and organizational recognition appears to encourage such employees and their peers to be more active in the new technology reporting process--especially, if the recognition is made on a timely basis.

Field Center Operations and New Technology Reporting

The procedures described above outline in very general fashion the way that the new technology reporting system has evolved over the course of two decades. However, there are substantial variations among the NASA Field

*Candidates for patent filing involve more detailed documentation than is the case for Tech Brief reports, including independent peer reviews at the Field Center and panel evaluation by technical specialists at NASA Headquarters.

Centers, so that the general pattern does not necessarily represent the way the system actually operates in any single Field Center. The new technology reporting operations will be described along three general dimensions: (1) organization and staffing, (2) typical procedures and variations in those procedures (using the six functions characterizing the new technology reporting function), and (3) special features of note found at one or more of the Field Centers.

Organization and Staffing

Before discussing the organization and staffing of the Technology Utilization Offices in NASA's Field Centers, some distinctions need to be made about mission and operational assignments each has, as they may affect the function of new tehcnology reporting. Of the eight major Field Centers, three--Ames, Langley, and Lewis--are Research Centers where there are extensive and diverse in-house laboratories. Approximately half of the funds available to the Research Centers are expended for in-house efforts. In the long run, one can expect reporting from these Centers to be derived principally from Center-conducted research in contrast to contractor-conducted research and development.

Marshall and Johnson are primarily systems-oriented Centers and conduct the bulk (by dollar volume) of their work via contract. Although each has important in-house laboratory capability, most new technology reporting will come from contractor-conducted research and development.

Goddard has important in-house laboratories, but in addition, it has major systems and project management responsibilities for space flight projects, and management of NASA's extensive space tracking network. Neither of these operational responsibilities is technologically "static," but both depend more upon available technology than do the Research Centers. Therefore, new technology is less likely to occur, or be reported.

The Kennedy Space Center, which was not included in this study, is NASA's launch operations arm. As such it is least likely to produce substantial new technology, although its contributions are valuable and recognized.

Finally, the Jet Propulsion Laboratory is NASA's only major Center that is a contractor-operated facility. Like the Research Centers, it has extensive laboratories and uses about half of its funding for contracting with other organizations. However, all of its new technology reporting activity is under the rubric of "contractor reported new technology." Additionally, the California Institute of Technology, the contractor responsible for JPL, has a history of aggressive patent activity.

The most common location for the Technology Utilization Office at a NASA Field Center is within one of the administrative or staff subunits. The most pronounced exception to this is the Technology Utilization Office at the Goddard Space Flight Center, which is located within the Engineering Directorate. At Goddard, the TUO orginally was located in the Directorate for Administration, but some years ago the core responsibilities for technology utilization were moved with the TUO to the Engineering Directorate. However, responsibility for monitoring the new technology reporting of contractors remained in the Administrative Directorate with the Goddard Patent Counsel's Office. Thus, the new technology reporting function is split, with the in-house activities being the responsibility of the Technology Utilization Office, and the monitoring of contractor new technology reporting vested in the Patent Counsel's Office.

In two other locations, the Johnson Space Center and the Jet Propulsion Laboratory, the technology utilization function falls under the general aegis of the patent counsel. This has been a recent move at JSC, where the TUO formerly was in the Office of Technical Planning. At JPL the patent counsel

coordinates both the patent disclosure and licensing responsibilities with those of new technology reporting and technology dissemination. Working closely with this group at JPL, of course, is the Technology Utilization Office at the NASA Resident Office.

At the Marshall Space Flight Center, the TUO is located within the Administration Directorate. At the Lewis Research Center it is located with the Office of External Affairs. At the Langley Research Center the TUO is a branch within the Research Information and Applications Division which is part of the Management Operations Directorate. The TUO at the Ames Research Center has been located in a number of areas, some technical and others administrative or staff. It recently became a part of the Space Station/Commercialization Office, reporting to the Center Director.

Staffing of the Technology Utilization Offices has been a constant challenge, with the staffing pattern more or less consistently falling since the early 1970s. In terms of fulltime professional staff, the "best" situated is JPL with six (counting at JPL both the NRO representative and JPL patent agents), followed by Langley, Lewis, and Marshall with four each, Ames, and Goddard with two each, and Johnson with one.

TABLE 1.
ORGANIZATION OF TECHNOLOGY UTILIZATION OFFICES
IN NASA FIELD CENTERS

Field Center	No. Fulltime Professional Employees	Location
Ames	2	Space Station/Commercialization Office
Goddard	2	Engineering Directorate (NTR for contractors with Patent Counsel)
JPL	6	Patent Counsel
Johnson	1	Patent Counsel
Langley	4	Management Operations Directorate
Lewis	4	Office of External Affairs
Marshall	4	Administration Directorate

Typical Procedures and Variations

The way in which each of the seven Field Centers approach the new technology reporting function will now be described in terms of the six broad elements of the reporting system: (1) promotion of reporting, (2) monitoring reporting, (3) assisting in the reporting, (4) evaluating the reports, (5) follow-up, and (6) awards.

Probably the weakest element in the new technology reporting system observed at the Field Centers has been that of promoting reporting--especially that from contractors. This also is one of the more difficult tasks as NASA officials have limited leverage to achieve reporting. Considerable attention was given to this aspect of the system during the first decade of the NASA Technology Utilization program. However, as both funding and staffing have been limited, the face-to-face promotion activities such as contractor site visits, special symposia or orientations, etc. are no longer possible. To a large extent, promotional activities are limited to in-house efforts, and even

these are not systematic. In the case of Langley, Johnson, and Marshall, the TU office sends a letter to the contractor at the beginning of a contract calling attention to the new technology reporting requirement, and briefly noting what is required.[8] Most commonly, promotional type activities consist of occasional probes via an informal or semiformal network of contacts that the TUO has with the Field Center technical divisions. In some instances (such as Langley, Lewis, and JPL) "coordinators" have been identified in each laboratory division to act as points of liaison and information for both in-house and contract new technology reporting. Although these networks are largely designed to monitor what is going on within the research system that might be captured as new technology, it also serves as an important communications link to motivate such reporting.

As part of the process of monitoring research and development activity of both in-house performers and contractors, nearly all TUOs routinely have access to the following sources of information relevant to identifying new technology: administrative progress reports of contractors, interim and final technical reports of contractors and local NASA laboratories, patent and licensing requests, requests to release information (made when a contractor employee seeks to present a paper or write an article for public dissemination), other Field Center reports, formal series technical publications (e.g., TRs, TMs etc.), and seminars or conferences.

In-house monitoring most frequently is accomplished by an informal set of contacts on the part of the TUO with colleagues or acquaintances within the technical divisions. At least one Center has considered a monthly status report by which technical monitors would be asked to identify potential sources for new technology monitoring as well as actual new technology reported. Langley recently instituted a procedure by which a representative

from the TUO is invited to participate in oral reviews conducted by the contract technical monitor where these are conducted on site at Langley.[9]

By far the most consistent type of monitoring is through the use of a card file or computerized system which follows the flow of paper from the contractor, noting when new technology is reported and the full particulars. Here, greatest emphasis is placed upon key contract reporting periods such as the requirement for a new technology report at the end of each 12 months of the contract, and the appropriate documentation at contract closeout. For example, Marshall uses a computerized tracking system that produces a "tickler" letter reminding the contractor of due or past due new technology reporting certifications.[10]

Another consistent practice among the Field Centers is close liaison and cooperation between the Technology Utilization Office and the Patent Counsel's Office with respect to exchanging pertinent information on new technology, whether it comes through patent and licensing requests, or through the identification and reporting of other than patentable new technology. There also appears to be a similar liaison between the TUO and the Field Center Procurement Office.

Each of the Field Center TUOs extends substantial assistance toward guidance and writing of new technology reports. This is especially true of individuals working at the Field Center who seek such assistance. Beyond this, however, much of the actual drafting of a new technology report (often the equivalent of a Tech Brief) is done within the Technology Utilization Office. This is true at Ames, Lewis, and Marshall, where technical reports (both contractor and in-house) and other sources of information are reviewed for material that would constitute a "reportable item." Often, that material then is recast in the form of a new technology report or a draft Tech Brief,

and may even proceed to the evaluation stage before the originator of the technical item has been contacted.[11]

As noted earlier, evaluating the new technology reports for the purpose of possible publication in NASA Tech Briefs is a responsibility where the final decision rests with the Field Center, even though SRI International has been retained as an independent source for such evaluation. The option of using an evaluation contractor was instituted some years ago as a cost-saving mechanism by NASA Headquarters. Field Center practice varies considerably. In the cases of Ames, Johnson, Marshall, and JPL, all reports of new technology which are complete are sent to SRI for evaluation. Those which are returned with a recommendation not to publish, may be reviewed again within the Field Center and this decision reconsidered and reversed. At Goddard and Langley, only those reports which are considered to be "in doubt" are sent to SRI for evaluation. Others are rejected or accepted directly within the Field Center decision process for publication.

At Lewis, none of the new technology reports are submitted to SRI. Lewis has an extensive internal review process which begins when the technology utilization engineers within the TUO jointly review the proposed items. If there is agreement within the TUO for publication, the cognizant technology utilization engineer drafts a "flash sheet" (actually a draft Tech Brief) which is sent to the technology utilization representative in the responsible technical division for review, including a review by the supervisor of the innovator. Following the technical division's review, further review is conducted at the Center, including review by the Patent Counsel for patentability, with the final signoff by the Director for External Affairs. The material is then sent to LTS for prepublication preparation.

Like Lewis, Langley prepares its own draft of the Tech Briefs sent to LTS. In this instance, they also prepare the Technical Support Package.

Except for JPL, all other Field Centers send the package of material which will become the Tech Brief to LTS for drafting of the Tech Brief and the TSP.

Follow-up in the reporting function is of two kinds: first, response to written and telephone inquiries from readers of Tech Briefs and others for further information; and second, to stimulate the required reporting where contractors have been negligent. The latter tends to be automatic, and has already been described regarding follow-up letters in the monitoring process which may originate in the TUO, or be stimulated by the TUO at closeout of a contract.

Providing follow-up information for technical inquiries most frequently involves meeting requests for Technical Support Packages generated by a reader of NASA Tech Briefs. Until July 1984, these inquiries were handled directly by the Field Center. Now the TSPs are sent to the requester by the NASA Scientific and Technical Information Facility (STIF) except for JPL, which answers TSP requests directly. Other written and telephone inquiries will be handled by the Field Center TUOs. A combination of these requests has ranged between 70,000 and nearly 240,000 per year in the course of the past decade. The bulk have been for TSP requests, but the number of general inquiries has tended to be on the rise.[12] It is difficult to obtain an accurate count of the general inquiries, because the Field Centers have not consistently recorded telephone inquiries. Marshall recently has instituted a simple form to record these and their disposition.[13]

JPL has an interesting outreach program in following up publication of its items in NASA Tech Briefs. Taking those Tech Briefs which have been patented or are being prepared for licensing, the TUO sends these with a cover letter to selected companies, seeking to make them aware of this technology development, and encouraging their interest. Companies are selected on the

basis of the apparent fit between the company's product and the nature of the technological innovation published. This usually involves 12-15 such letters for each new technology item selected for this particular kind of focus. Ames Research Center has instituted a pilot study to determine the utility of a somewhat similar approach with its new technology innovations. Several years ago, Lewis had a similar program where selected Tech Briefs were sent to companies and organizations thought to be "interested."

Field Centers generally follow similar practices in processing and presenting awards relating to Tech Briefs. Shortly after the decision is made to publish a particular new technology report as a Tech Brief, the Field Center prepares the necessary papers and forwards them to the Inventions and Contributions Board (ICB) at NASA Headquarters for the preparation of the certificates and issuance of the appropriate checks. Checks and certificates are sent by NASA Headquarters to the originating Field Center, which will then make arrangements for presenting the awards to those NASA personnel who achieved them, and forward the awards to senior corporate officials in organizations where contractor personnel were the innovators. Awards usually are given by senior organizational officials at an appropriate ceremony, with publicity in the organization's newsletter and elsewhere.

There was a time when Tech Brief awards were given to two classes of reports, based upon screening and evaluation. Category I included all reports judged worthy of publication in full. Category II consisted of reports of not quite the standard of Category I, but were considered of sufficient value to be made available in summary form. From time to time the Category II briefs were published, but not on a scheduled basis. Several years ago NASA discontinued giving the Tech Brief award to authors of Category II reports. In the recent issues of NASA Tech Briefs, the publication of these summary reports

has been resumed under the heading of "Books and Reports," in each section following the more fully detailed Tech Briefs.

Some companies such as Rockwell International have a parallel system of awards, whereby the company will give an award for publication in NASA Tech Briefs (or application for a patent), as does NASA.[14] Earlier it was noted that persons who have their innovations published in NASA Tech Briefs can also be eligible to receive higher awards under the Inventions and Contributions Board award program in NASA--both NASA and contractor personnel are eligible. At Ames and Marshall, new technology reports routinely are reviewed for possible inclusion as candidates for additional awards by the ICB.

At Lewis and Langley considerable emphasis is placed upon vying for I-R 100 Awards. These awards are sponsored annually by Research and Development magazine which is published by a Dun and Bradstreet affiliate. The awards are given to the 100 "best" innovations, recognized by and presented at a national dinner, where major corporations and research organizations are represented. Between 1966 and 1983 NASA laboratories earned 55 such awards (ranking third in the country among all-time winners). Within NASA, Lewis had 40 winners, Langley 10, Marshall, JPL, and NASA Headquarters one each and Goddard two.[15]

Special Features

Each of the seven NASA Field Centers visited has one or more "special features," or a unique element to enhance the general purposes of new technology reporting. These are worthy of highlighting here, and provide a potential for expanded information exchange among the Field Center TUOs for possible application elsewhere.

Ames Research Center

Ames is one of the few Centers where new technology reports routinely are included in the screening process for potential ICB awards. Expanded use of this major award system holds the potential of wider visibility, and therefore

improved support of new technology reporting among both in-house and contractor personnel. Another feature is Ames' pilot study to determine the feasibility and value of "targeting" likely industrial users for a special focus by mailing and otherwise distributing NTR-generated information. The goal here would be to supplement the general distribution (via NASA Tech Briefs) with more highly focused distribution of information about specific technological innovations.

Langley Research Center

Recently, Langley has made an explicit modification in its contracting procedures to include within the periodic oral review between the contract technical monitor and the contractor representative, specific attention to the contractor's performance and potential for new technology reporting. This is to be further stimulated by attendance of a TUO staff member at such reviews, when held at Langley, or the technical monitor when held at the contractor's facility.

Lewis Research Center

Lewis has a strong in-house rogram of internal review whereby new technology items are assessed for potential publication and other use. This appears to have strongest impact on work done within the Lewis laboratories. It is also stimulated by concerted participation in the IR-100 Award program. These two efforts complement one another in giving greater visibility to technological innovation, and stimulate its reporting.

Goddard Space Flight Center

Goddard gives what appears to be the most rigorous attention of any Field Center to new technology reporting plans submitted by contractors in the initial phase of the procurement process. This review is conducted primarily in the Office of the Patent Counsel, and closely coordinated with the Field

Center Procurement Office.[16] Goddard also uses a three-tiered classification system, identifying potential for new technology reporting in its tracking system. Those contracts judged as having the highest potential are given closest attention.

Jet Propulsion Laboratory

As noted earlier, JPL operates much like a NASA "in-house" Field Center, but it does reflect several important distinctions. As a contractor operated NASA facility, it reports as a contractor so that data on new technology reporting are labelled as contractor reporting. The California Institute of Technology's contract with NASA specifically calls for JPL to maintain a patents and technology utilization function (as an allowable cost).[17] The two functions work under a single head. Five patent agents work full time to screen technical papers and reports by JPL personnel or contractors supervised by JPL in its 65 technical divisions. These agents thus fulfill two functions concurrently: identifying patentable items and non-patentable items--both candidates for Tech Briefs. No other NASA Field Center has as closely integrated an effort, nor the professional staff resources devoted to it.

JPL currently conducts targeted mailing of selected Tech Briefs to identify possible interest in licensing opportunities among selected companies that are likely to have an interest in the particular technical innovation.

Johnson Space Center

Johnson Space Center's contract with Rockwell International, which has provided for a Rockwell technology utilization group since 1965, is a notable accomplishment. First, it provided for systematic promotion of new technology reporting among subcontractors that might otherwise have gone untended. Second, it appears to have produced worthwhile results in a significant number of new technology reports--both by subcontractors and Rockwell. Third, this

unique contract provision (and funding) has been kept intact through periods of retrenchment when there are annual attempts to discontinue the program. Finally, the true uniqueness of this arrangement can be judged by the "contracting environment" in which it is set. Across the Federal Government, in contract administration practice, new technology reporting is the only requirement laid upon a prime contractor for which they do not remain responsible for its conduct by their subcontractors. This provision in the Rockwell contract was an experiment that carried the possibility of potential leaks of proprietary information considered valuable by subcontractors.[18] It is a tribute both to Rockwell International and to NASA that there have been no such problems reported in the two decades of this effort.

Marshall Space Flight Center

Although other Field Centers have automated tracking and data retrieval systems (though none are using a common system), Marshall probably represents the most integrated system tied to a contractor notification process whereby contractors are reminded of upcoming new technology reporting deadlines, and then appropriately followed up where those reports are not forthcoming.

In Retrospect

Given the challenges of obtaining new technology reports from NASA contractors on a timely basis, the outside observer cannot help but be disappointed in the general weaknesses in the system as it operates today. Considerably more attention to stimulating such reporting appears to hold substantial potential. On the other hand, the TUOs in NASA Field Centers have done a remarkable job, given the resources and circumstances within which they are constrained. They have demonstrated great creativity. Additional improvement can be expected with some cordial assistance from Headquarters in dealing with those factors discussed in the next chapter.

CHAPTER 2 FOOTNOTES

1. See NASA Federal Acquisition Regulations, Supplemental Directive 84-1 (April 1, 1984) Subpart 18-27.3 Patent Rights Under Government Contracts.

2. See Appendix D, Samples of Material to Facilitate Contractor Reporting.

3. Data furnished by Leslie Badin, Head, Technology Utilization Group, Space Transportation Systems Division, Rockwell International, May 23, 1985.

4. See: Ruth M. Lizak, NASA New Technology Identification and Evaluation (SRI International, February 1983) pp. 3-7.

5. At the time this report is being written, only the first quarterly issue in the 1985 series has been published by Associated Business Publications. It is too early to make a judgment regarding how this new arrangement will affect either the number or the nature of the recipients of the publication.

6. The 1977 study of Tech Brief cost-benefit analysis is an example of this. Using this process, DRI also has collected hundreds of examples of the documented use of NASA technology by commercial firms--principally from readers of NASA Tech Briefs.

7. From material furnished by Mr. Joseph Labow, Acting Staff Director, Inventions and Contributions Board, NASA.

8. See Appendix D, Samples of "Awareness Material from NASA Field Centers."

9. See Appendix D, Contract Word Processing Manual, Change No. 21.

10. See Appendix D for a sample of this type of letter. Rockwell uses a similar system with its subcontractors on the Space Transportation Systems program.

11. Typically, this is because of several considerations: (1)the responsible TU official usually is pressed for time, and (2) most do not wish to "unduly" arouse the expectations of a fellow engineer about a possible Tech Brief award until the draft has cleared successfully the evaluation process.

12. See Appendix C, Table 2.

13. See Appendix D.

14. Many of the larger companies such as GE, RCA, TRW, and Grumman have such award systems.

15. NASA Lewis Research Center, "Technology Transfer Under the Lewis Technology Utilization Program," April 1984.

16. See Appendix D for a GSFC Counsel's recommendation for improving this review process.

17. The contract language is as follows (Contract No. NAS7-918, Modification No. 3, Article 15--Patent and New Technology Services).

The Contractor agrees:

(a) With respect to Patent Services:

(1) To utilize qualified patent personnel to prepare --- detailed technical descriptions in patent specification form on inventions made by the contractor's employees ---

---

(4) To assist in the evaluation of reportable items related to this prime contract and subcontracts hereunder;

(b) With respect to New Technology Services:

(1) To assist in the evaluation of reportable items relating to this contract and subcontracts hereunder for possible publication in NASA Tech Briefs;

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(2) To furnish available backup materials assembled in a Technical Support Package (TSP) on all reportable items which are made by Contractor or subcontracator employees as defined by clauses in this contract entitled "New Technology" and "Patent Rights" and which have been published as a Tech Brief;

(3) To furnish written replies to inquiries from NASA, other Government organizations, Government contractors and private individuals or industries, relating to reportable items incorporated in said Tech Briefs utilizing only information in possession of the Contractor or made available to the Contractor by the Contracting Officer.

18. Information furnished by Marvin Matthews, Patent Counsel, Johnson Space Center.

CHAPTER 3
FACTORS HAVING A SYSTEMATIC EFFECT UPON NEW TECHNOLOGY REPORTING

There are a wide variety of factors, both internal and external to NASA, which affect new technology reporting. During the course of this study, six factors emerged as having highest importance--two external, and four internal. In general order of importance these are: (1) general Federal policy, (2) agency priorities and allocation of resources, (3) organizational environment, (4) interest of the technical monitors, (5) awareness, interest and motivation of contractors, and (6) the general stage or status of major research and development programs. Each of these can affect the quality and quantity of new technology reported throughout the system.

General Federal Policy

This "external" factor is considered most important because it establishes the general framework and boundaries within which NASA must operate, and subsequently, the very broad constraints/opportunities within which new technology reporting activities must be conducted.

In a 1983 report to the Administrator titled "NASA Partnership With Industry: Enhancing Technology Transfer," DRI reviewed seven major Federal public policies with respect to their effect upon innovation, and more particularly upon technology transfer.[1] The broad policies reviewed were: tax, patent, antitrust, regulatory, research and development support, conflict of interest, and freedom of information policies. The report characterized three different categories of policy: (1) those of a general macroeconomic nature which affect the overall health of the economy. It was noted that these policies help to create a strong and growing economy, engender a feeling of confidence in the country's economic future, and thereby encourage innovation. (2) A second group of policies included those which generally were created for

purposes other than promoting innovation but which could have an effect upon that process, such as antitrust, regulatory action, freedom of information, and conflict of interest policies. (3) The third group included those that were created to promote innovation, such as patent policy, tax policies related to innovation, and procurement policies related to the direct Federal support of research and development.

It was the conclusion of that report:

> Generally U.S. tax policies have provided favorable incentives for R&D activities, including provisions for a variety of organizational arrangements designed to promote innovation and technological development by new businesses.[2]

Further, the report noted that a 1978 study conducted by the Congressional Office of Technology Assessment concluded that the two most effective policies in influencing the rate and direction of technological change have been Federal research and development support and procurement of innovative technology-based products.[3]

On the question of patent policy, the report traced the gradual liberalization since World War II of that policy with respect to contractor access to patent rights of work conducted under government support.[4] It noted that "patchwork" corrections to the system were drawing attention to the need for a comprehensive or fundamental reassessment of the system. That began in July 1981 when PL 96-517 went into effect. Essentially, it gave first refusal rights on patentable innovations, conducted under Federal R&D funding, to the contract performers if they were small businesses or nonprofit organizations (including universities). In the next (98th) Congress attempts were made to extend this practice to all other contractors, essentially bringing in medium and large businesses.[5]

It is clear that the intent of this legislation has been to make technological innovations that occur under government sponsorship more readily available for commercial exploitation--presumably, accelerating the technology transfer process. However, by late 1983, preliminary data were becoming available to NASA suggesting that PL 96-517 might be having some negative impact upon the new technology reporting system. Part of the problem appears to stem from the repeal of Section 305 in the National Aeronautics and Space Act of 1958 in which the new technology reporting clause is found, combined with changes in the reporting periods under the new legislation.

Changes in Patent Procedures

The general effect of Public Law 96-517 and the associated Presidential Memorandum has been to transfer the waiver option from NASA to its contractors. Such organizations conducting R&D under NASA contract no longer need the agency's approval to take title to inventions resulting from their work.[6] However, they must take positive action by filing a disclosure notice followed by notification to elect title.

PL 96-517 requires disclosure of each invention to the appropriate Federal agency "within a reasonable time after it is made." Recently issued Federal Acquisition Regulations (FAR) establish a procedure for implementing PL 96-517, including specific time requirements. Contractors will be required to disclose inventions to the appropriate Federal agency within two months after the invention has been reported to "contractor personnel responsible for patent matters."[7] Within twelve months of such disclosure, the contractor must decide whether to retain title. The contractor then has two years following election to file for a patent.

Thus, the new Federal Acquisition Regulations allow the contractor more time for invention disclosure and patent application than has NASA's new technology reporting procedure. Under FAR, no time limit is specified for

reporting inventions to contractor patent personnel, and after this reporting, the contractor has up to three years to apply for a patent--as opposed to one year under past NASA practice.

Furthermore, FAR uses a more narrow definition of what must be reported. Only patentable inventions must be reported, whereas NASA has required reports on inventions, innovations, improvements and discoveries. The broader definition has enabled NASA to be informed about innovations (such as new software) which may not be patentable but could be important in other applications.

Table 2 summarizes this comparison of new FAR procedures and NASA new technology reporting practices:

TABLE 2.
A COMPARISON OF INVENTION REPORTING AND
PATENTING PROCEDURES (FAR) WITH NASA NEW TECHNOLOGY REPORTING*

	Changes Resulting from PL 96-517	NASA New Technology Reporting
• What must be reported	patentable inventions	inventions, innovations, improvements, discoveries
• When reported:		
to contractor (internally)	unspecified	unspecified
to agency	within 2 mos after disclosure to contractor patent personnel	within 6 mos after invention
• When patent election made	within 12 mos after disclosure	within 6 mos after report
• When patent election made	within 2 years after election	within 6 mos after election

*Note: NASA's procurement regulations conform to recently issued FAR amendments covering PL-517 and the Presidential Memorandum. This table contrasts the systems.

Impact Upon New Technology Reporting

It is still too early to assess the full impact of PL 96-517. One factor contributing to the uncertainty of results regarding PL 96-517 is the questionable validity of the principal assumption underlying the legislation. The Congress assumed that if this government-sponsored technology was of any value, it would be reported by the contractor to perfect its patent rights. This is akin to the myth that the world will beat a path to the door of the better mousetrap inventor. Further, it was assumed that contractors generally were patent conscious and, given the passive opportunity, would seek patent rights. This is more the exception than the rule among universities, although some do vigorously seek patent rights. In addition, it was generally ignored that patent application requires disclosure, and in the current atmosphere of rapid technological advance, companies may seek what they consider better protection by withholding disclosure and treating new innovations as trade secrets.[8]

Another factor clouding currently available data is the lag between first reporting, then filing an application--which may be longer than the four years that have passed since the law came into effect. Indeed, many of the inventions reported after July 1981 may not yet be reported for patent election. As a result, a comparison of applications for patent or notification before and after July 1981 may underestimate the number of applications that ultimately will occur since the passage of PL 96-517.

Recognizing the shortcomings in data availability, one means of assessing the law's impact is to compare the number of times NASA contractors have elected title to inventions before and after July 1981. Although neither the FAR regulations or previous NASA regulations specify a time for reporting inventions to contractor personnel, one may assume that substantial lags are

unlikely where the contractor recognizes potential commercial value. That is, if we assume that the time between invention and electing title is relatively brief, a comparison of the number of title elections reported provides a first approximation of the effects of the law.[9]

Within NASA, this comparison reveals that the policy change has been accompanied by a decline in title elections. During the two years prior to July 1981, individuals, small businesses, nonprofits and universities requested patent waivers on 22 inventions. During the first two years the law was in full effect, July 1981 through June 1983, NASA records reveal only two cases where these entities elected title to inventions made under NASA contract or grant.[10] (See Table 3.)

TABLE 3.
REQUESTS FOR WAIVER OF NASA PATENT RIGHTS, July 1979-June 1981,OR ELECTION OF PATENT TITLE, July 1981-June 1983--Organizations Under NASA Contract/Grant Subject To PL 96-517*

Period	Individual or Small Business	Not For Profit	University	TOTAL
June 1979-June 1981	17	1	4	22
July 1981-June 1983	0	1	1	2

*Data on applications for patent waivers were compiled from the docket cards of the Inventions and Contributions Board at NASA. The data exclude: (1) applications by businesses listed in Dun & Bradstreet as exceeding 500 employees or $10 million sales, (2) applications by the California Institute of Technology, which include applications by the Jet Propulsion Laboratory (JPL), (3) voided applications, and (4) applications for advanced waivers, which are blanket waivers not specific to a particular invention.

PL 96-517 may have removed an incentive for reporting inventions to NASA. Prior to the law, obtaining a patent waiver from NASA was an essential step to acquiring title to the inventions. With passage of the law, this step is bypassed. As a result, contractors no longer have this incentive to report inventions to NASA. Nevertheless, the contract still requires that innovations be reported (in the case of other than small business or not-for-profit

organizations), and the law still requires that inventions elected for patent be disclosed.

Although one cannot claim an immediate, direct correlation, data on reportable items received by NASA under the new technology reporting system have declined. When a comparison is made between the two year period immediately preceding the effective date of PL 96-517 and the following two years, total reporting declined 19 percent, but contractor reporting declined 24 percent.

TABLE 4.
COMPARISON OF REPORTABLE ITEMS RECEIVED BY NASA FIELD CENTERS, JULY 1979-JUNE 1981 AND JULY 1981-JUNE 1983*

All Field Centers	July 1979-June 1981	July 1981-June 1983	% Change
In-House	1,029	950	- 7.7
Contractor	2,399	1,800	-24.0
Total, All Sources	3,399	2,750	-19.1

*See Appendix C, Table 3 for full details by Field Center.

S.2171, introduced in the First Session of the 98th Congress (November 1983), would extend the provisions of PL 96-517 to all other companies. Although hearings were held on the bill in both the House and Senate, and the Senate passed the bill, action was not completed in the House. S.64, introduced in the First Session of the 99th Congress, is essentially the same bill.

Some conclusions are straightforward. Federal policy, which once supported public ownership, now favors private rights to inventions made under Federal sponsorship. The law embodying this shift is less stringent (or complete) in reporting requirements than previous NASA policy. Time limits for reporting inventions and applying for patents have been extended. The definition of reportable items has been narrowed. Since passage of the law,

fewer title elections have been reported to NASA. New technology reporting to NASA has fallen substantially.

Other conclusions are more speculative. The law may be responsible for the decline in both patent and new technology reporting at NASA, perhaps because it relaxed reporting standards and removed an incentive to report. Other factors could influence invention reporting. There remain too many unanswered questions to be able to assure that the recent changes and proposed changes in patent law will not adversely affect NASA's new technology reporting efforts. Indeed, what early data are available suggest substantial negative impact.

In conclusion, there are several elements of the new patent policy which undermine new technology reporting in NASA. First, PL 96-517 and the proposed extension repeal Section 305 of the National Aeronautics and Space Act of 1958 which provides the basis for new technology reporting. This charter legislation was worded to expand what was to be reported beyond that typically covered in traditional patent matters. Since the revised legislation is directed at patent policy, broader concerns of new technology reporting are basically ignored, yet its basis in legislative authority is removed. This clearly weakens NASA's leverage to obtain the kind of new technology reporting that has been the foundation of NASA's Technology Utilization program.

Second, the more limited definitions of what is to be reported (innovations that are patentable) substantially reduces reporting and provides no basis for agencies to require broader technology reporting where that has proved valuable, such as NASA's Technology Utilization program. A significant number of applications of technology promoted through NASA's Technology Utilization program have involved non-patentable items. For example, 68.6 percent of all items published in NASA Tech Briefs for the four years 1981-1984 were not patentable items.[11] Of contractor reported items published, nearly 80

percent were not patented (see Table 5). Only the organized efforts of the Technology Utilization program, of which new technology reporting is a key element, provide a broad awareness of such technology that otherwise would not come to the attention of widely diverse potential users.

TABLE 5.
SUMMARY OF ITEMS PUBLISHED IN NASA TECH BRIEFS
BY SOURCE AND WHETHER PATENTED
(Volumes 5-8, 1981-84)

	Patented		Not Patented		
	No.	% Total	No.	% Total	Total
Source					
In-House (NASA)	275	61.8	170	38.2	445
Contractor	280	21.1	1045	78.9	1325
Total all sources	555	31.4	1215	68.6	1770

Third, the time limits for reporting by contractors under the recently promulgated Federal Acquisition Regulations permit up to three times the period from reporting to patent action. First disclosure by the contractor to the agency may be delayed for an undetermined period until the contractor's officer responsible for patents is officially notified. This creates a circumstance in which substantial delay can occur in making the broader community of potential users aware of an innovation. In addition, defensive behavior by contractors is encouraged whereby innovations considered marginal by the contractor remain unreported to prevent unforeseen benefits to potential competitors. That is, there would be neither incentive nor leverage from NASA to stimulate such reporting and, thereby, a greater awareness. It should be noted that this problem is not as acute for agencies such as the National Science Foundation, the Department of Health and Human Services, or the U.S. Department of Agriculture where the research clientele consists primarily of universities and affiliated not-for-profit groups. They do not feel the same

power of economic competition as do the bulk of NASA research and development contractors.

In summary, although the data available are fragmentary and far from definitive, when combined with more than 20 years of technology utilization experience and the logical impact on NASA of the implementing regulations for the new patent policy, the overall effect is to undermine the new technology reporting process and, thereby, weaken NASA's Technology Utilization program.[12] These results flow primarily from: (1) a narrowing of the scope of what is reportable; (2) liberalizing the reporting time frame which requires more follow-up by NASA (making it less likely and less effective because of staffing restrictions); and, (3) an encouragement of the general myth that technology transfer is "self-executing."[13]

Agency Priorities and Allocation of Resources

The technology transfer process is a complex and tenuous one, and that element of it which constitutes new technology reporting is especially so. The system depends upon the extent to which innovators (that is scientists, engineers, and technicians who develop and use the new technology) can be encouraged to participate actively in the reporting system. Obviously, if a contractor's project staff or a NASA researcher sees value in participating in the system, it will operate most effectively. However, experience has demonstrated that this process of developing awareness and a continuing interest is most likely to be accomplished through frequent contact with individuals who have responsibility for this function, supplemented by encouragement through the informal networks of engineers, scientists and technicians. This translates into human effort, often on a person-to-person basis. To be most effective, the new technology reporting system cannot depend primarily upon a

routine, paper reporting operation, although it probably can be sustained to some extent in that fashion.

Essentially, this means that new technology reporting is a "level of effort" activity. Its level of effectiveness or completeness depends upon the priority given to it at the respective Field Centers and in NASA Headquarters, followed by resources (budget and personnel allocations) to meet that level of priority. Technology transfer in general, and new technology reporting functions in particular, have suffered from an up and down wave-like trend in funding, further complicated by a general downward trend in staffing these functions. Other factors aside, one can note the general downward trend in new technology reporting following the general pattern of staff decline.

In like fashion, one can note variations from Field Center to Field Center, largely based on the level of management support for the function, but also reflecting the relative emphasis on new technology reporting among the various Technology Utilization offices. The only exception found to the general downward trend (or holding steady) with respect to staffing patterns was at NASA's Lewis Research Center where there is active consideration to adding another professional to the Technology Utilization staff.

Suggestions will be made later in this report about possible alternatives for addressing the priority and resource allocations challenges. It is possible to reinforce the new technology reporting function through indirect use of resources outside the regular Technology Utilization program, but this could only be done with the support of other Field Center elements, most likely with the encouragement of Field Center management.

Organizational Environment

Each Field Center, and NASA Headquarters, has its own set of distinct characteristics that set it apart from other organizational elements within

NASA. This "organizational environment" may facilitate or hinder new technology reporting.[14]

One important element contributing to the organizational environment is the general "standing" of the technology utilization function within NASA and each of NASA's Field Centers. At the Headquarters level this function has suffered from leadership turnover and an inability to fully support, on a consistent basis, the technology utilization function in the Field Centers. Apart from what one might expect to be the "normal" tension between a headquarters and field center activities, this inability to provide consistent direction and support tends to widen that gap. A recent example of this particular problem occurred several years ago in the operation of the Tech Brief award system. It had been the practice to provide Tech Brief awards to Category II reports. When the decision was made to discontinue publishing these reports, the Inventions and Contributions Board staff argued that awards for these reports could no longer be justified as "significant," in keeping with the Space Act award system. The awards for Category II were then discontinued. The result was substantial disappointment on the part of individuals who had been notified they were "due an award," creating substantial difficulty for the TU offices at the Field Center level in their future relations with those organizations that had been turned down.

Apart from their relationship to Headquarters, the Field Center Technology Utilization Offices do not consistently enjoy strong Center management support. This, of course, will vary depending upon who is the director of the Field Center. Generally, one can judge the relative status of the function by the resources--particularly personnel--assigned to it, and to a certain extent, to its place in the Center's organizational structure.

Perhaps the strongest institutional element of a distinctly positive nature affecting new technology reporting is the awards system. Both contrac-

tor and NASA officials attest to its positive value in stimulating both awareness and active participation in the system. The awards system presents an opportunity to improve on new technology reporting through strengthening a process that already has demonstrated success.

Focusing on the more narrow question of organizational environment and its effect upon new technology reporting, one can say that Field Center management tends to reflect Headquarter's senior management with respect to the relative value placed upon this function. It can best be characterized as one of "benign neglect," or general neutrality. Throughout the history of the Technology Utilization program there have been only a few instances where senior agency management has demonstrated a personal interest in the new technology reporting function. Even if such interest were expressed, it might not result in the kind of response that would be most useful in the long run for the function.

For example, in the course of visits to Field Centers, officials recounted instances when a past NASA Administrator "stimulated" new technology reporting through selected visits with top management of major aerospace contractors. Shortly thereafter there was a marked upsurge in the number of new technology items reported. However, these observers noted that there was also a decline in the "quality" of the items reported so that a substantially lower percentage were judged as publishable for NASA Tech Briefs distribution. As the new technology reporting system became routinized, and the promotional activities slacked off, there was a natural tendency for it to be treated as more of a "boiler plate" monitoring function.

From the perspective of the Field Center Technology Utilization Office, this function is not very exciting, particularly when compared to other activities such as the applications projects in which the TUOs can be more deeply

involved, and achieve a closer, more personal satisfaction from successful transfer. Even in the best of circumstances, it is difficult to push contractors into making the maximum potential contribution through the reporting system. Apart from the declining level of resources for promotional activity among contractors, the magnitude of the challenge may also have some effect on the extremely limited promotional activity among contractors today. What little activity of this nature does occur is aimed more directly at in-house participation, and even this tends to be sporadic and not too systematic.

This concentration on in-house reporting is to be expected. First, with the physical proximity of the research scientists and engineers, it is easier and more natural for the Technology Utilization Office personnel to have both professional and personal contact with colleagues who may be innovators in the reporting system. Second, the nature of the work at the Field Center is another important factor. For example, the Research Centers (Ames, Langley, and Lewis) consistently have a higher ratio of new technology reporting from within the laboratories compared to contractor reporting.[15] By the same token, the heaviest proportion of contractor reporting comes from Marshall and Johnson Space Centers--those most engaged in contracting for larger programs/projects.

Finally, one cannot avoid the conclusion that the new technology reporting function provides little recognition or kudos for those individuals, either within NASA or in the contractor organizations who do an especially good job of facilitating the process. The Space Act awards system is limited to <u>recognition of the innovator</u>. Those who keep the wheels greased and the system moving, such as the contract technical monitors, the new technology representatives of the contractors, and the responsible persons in the TU offices, are essentially left out of this recognition system. This is un-

fortunate because, as one contractor official put it, the Technology Utilization program is an important element in helping to "keep the space program sold."

Interest of Technical Monitors

Program and project technical monitors in the Field Centers represent the key pivot or "linking pin" to an optimal new technology reporting system. These contract officer representatives or technical monitors are NASA's principal link for the substantive work with a particular contractor. These are the individuals who know what is going on in greatest depth. Typically, they are familiar with the principal contractor personnel, current state of operations, technical goals of the project, and are the best individuals within NASA to judge potential areas for development of innovation. The key challenge to the Technology Utilization Officer is how best to engage the technical monitor in a positive fashion that will facilitate the new technology reporting process.

Each of the Field Centers visited reflected close contact between the Technology Utilization Office and a number of the technical monitors. However, this remains a resource to be more fully exploited. Few of the Centers have systematic contact established between the TUO and the technical monitors. The greatest extent of contact appears to be at Langley, Lewis, and JPL where new technology reporting responsibilities are identified with a particular individual in each of the technical divisions for liaison purposes. This may be face-to-face on an informal basis, or through a more regularized formal reporting procedure. Even where it is most regularized, there is considerably less than complete coverage of all the technical monitors. The number who are principally "reactive" to the prodding of the TUOs is substantially greater

than the number of technical monitors who are "self starters" in the new technology reporting process.

None of the NASA Field Centers compares with Rockwell International's program of new technology reporting in terms of covering the technical monitor function or promoting new technology reporting through orientation, site visits, etc. This should be expected, since none of the Field Centers has a staff exclusively directed to new technology reporting to the extent that Rockwell has. It does, however, provide an example of what is possible with a program carefully developed over several decades, and with sufficient resources.

It must be recognized that the Technology Utilization Office has little leverage over the technical monitors in today's system, except to interest them in the technology transfer process and its psychic rewards. These should not be minimized. The study team had the opportunity to talk at some length with a number of technical monitors who are enthusiastic about their participation in technology transfer activities, and in facilitating new technology reporting. However, the process of "bringing on board" a research engineer or research scientist at a Field Center, and developing this productive relationship certainly requires considerable time, effort, and patience. At the present time none of the Field Centers really is sufficiently staffed to achieve the potential it appears to offer.

Awareness, Interest, and Motivation of Contractors

The NASA contractor's relationship with NASA's new technology reporting system begins with the contracting process. Once a contractor has been selected to undertake a particular project or task, and if the total value of the contract is $2.5 million or more, the contractor is required to submit a new technology reporting plan. See Appendix F for an example of a major con-

tractor's new technology reporting plan and supporting documents. It illustrates a well-designed program that, to the extent implemented, should produce good results. This plan may be relatively extensive and detailed (as in this example), or it may be a few paragraphs describing how the contractor intends to assure that its key employees understand the new technology reporting requirements and how to identify new technology items.

Upon award of the contract the contract officer or the project manager may receive a letter from the originating Field Center directing attention to the new technology reporting requirements.[16]

The most extensive promotional activity on new technology reporting at contract initiation remains that done by the technology utilization group in Rockwell with their subcontractors. A member of the technology utilization group will contact the project manager or other senior subcontractor official and arrange for a visit and orientation on new technology reporting.

For contractors that have been doing business with NASA for many years, the new technology reporting system can easily become "bureaucratically routinized." This has both positive and negative aspects. For example, those contractors that have been in the system from the time it was first initiated and during which there was a considerable amount of enthusiasm, appear to have continued a reasonably positive emphasis on identifying and reporting new technology. On the other hand, as the process becomes routine, there is a stronger tendency to think of or be reminded of the need to report new technology only at the set points in the contract period that require formal reports--such as annually or at the closeout of the particular project effort.

Based on discussions with both NASA Field Center personnel and NASA contractor personnel, there is a general consensus that responsibility for new technology reporting among contractors is most likely to be vested with a

project manager or senior project engineer in the case of the smaller contracts or contracts with small businesses and other modest size contract organizations. The larger contracts and those handled by the major aerospace companies tend to use their patent counsel organization and the system set up for reporting potentially patentable items as the main vehicle for meeting the new technology reporting requirements of NASA. This incorporating the new technology reporting needs of NASA into the "normal" company in-house system has both positive and somewhat negative aspects. First, on the positive side, it incorporates the NASA requirement into a "normal" channel that is well understood and used, and therefore is likely to be productive in terms of providing meaningful reports. The disadvantage is that, by being incorporated into an existing channel of reporting, there is less likely to be a special effort to dig out new technology which falls outside the usual parameters of potentially patentable items. In spite of this potential barrier, the system has to be considered reasonably successful since nearly 80 percent of the items originating from contractors and published in NASA Tech Briefs over the four-year period from 1981-1984, were items that had not been patented.[17]

Regardless of the system that the contractor establishes to meet NASA's new technology reporting requirements, there is agreement that the basic contractor motivation is to satisfy the client--i.e., NASA. So the key becomes the technical monitor responsible for oversight of the contract on behalf of NASA. If the technical monitor presses the new technology reporting function, the contractor organization probably will be forthcoming to a larger degree than if the technical monitor pays only perfunctory attention to this element.[18]

Stage/Status of Major R&D Programs

A major factor which can have an important impact upon the number and/or quality of new technology items reported, but which is independent of the system itself, is the stage or cycle of major research and development programs. For example, the large manned space programs such as Mercury, Gemini, Apollo, Skylab, and Shuttle, and even a number of the major unmanned flight projects can be expected to have a "cycle" during which new technology reports are most likely to ebb or flow. NASA technical managers observe that major development projects such as these can be expected to have periods of "greatest innovation" several years into the project's beginning, peaking just before the mid level where funding is actually highest, then tapering off as the project "matures," and comes to conclusion. The innovations with longer term consequence are most likely to be made in this period, while the "quick-fix" and process type of innovations may occur at the mid-point and shortly thereafter as the program enters its initial flight stages.

The study team made exploratory efforts to see whether or not the reporting of new technology, the flow of funds, and personnel dedicated to a particular project and other indicators of technical activity might be compared. Quite apart from the difficulty of obtaining representative measures of technical activity, the inconsistencies in when an innovation was actually made, then reported were too great to have any confidence by using reports in a given time period to represent this activity. However, there was broad consensus of those interviewed that these cycles are real, to be expected, and therefore one should be cautious about attributing "problems in the system" to the ebbs and flows in terms of the numbers of reports made in any given time period.

Likewise, a particular Field Center or contractor's role in a major project can either limit or expand the opportunities for innovation. For

example, technical monitors in NASA Field Centers whose responsibility includes predominently basic research contracts, have far fewer new technology items reported than do those responsible for engineering development contracts. Thus the numbers can be expected to vary by source, depending upon the point in the research spectrum where the objectives of the contract are directed.

Finally, the emphasis in recent years within NASA to be less "risky," and more "cost-effective," has resulted in strongly encouraging those who direct new projects to limit their search for new technological solutions and rely more upon "proven" technology. This, in itself, can be expected to reduce the number of new technology items reported in the future. However, when a large project, such as Space Station, begins its development phase, one can expect an upsurge in new technology reporting because of the need to engage more heavily in technological problem-solving, even if this involves new combinations of technology rather than substantial amounts of new technology per se.[19]

In Summary

Of the six factors having a systematic influence upon new technology reporting, Federal policy and--most immediately--patent policy is of greatest importance. The full range of effects from the enactment of PL 96-517 is yet to be determined, but it is reasonably clear that NASA must take some action to protect its authority under Section 305 of the Space Act to continue its new technology reporting system without substantial diminution.

The four factors over which NASA has principal control essentially boil down to how highly NASA's senior leadership (Administrator and Field Center Directors) values the new technology reporting function. Some marginal improvements may be possible through enhanced management practices by TUOs or

some rearrangement of current TU activities. But TUOs already have shown considerable innovation in keeping the program at the level of effectiveness where it is today. The increased participation of NASA's technical monitors holds the key to significant and lasting improvement; and this will only occur as more effort is expended in soliciting their active participation, with continuing support from top management to encourage that participation. Ultimately, that translates into more time of professionals spent on the function.

The sixth factor, the stage or status of major NASA research and development programs, is more of a naturally occurring phenomenon. Its principal value is as a continuing caution in assessing reporting progress and expectations so that undue credance is not given to numbers alone.

CHAPTER 3 FOOTNOTES

1. Chapman, Richard L., "NASA Partnership With Industry: Enhancing Technology Transfer," University of Denver, Denver Research Institute, Denver, CO, July 1983. See Appendix E "Selected Governmental Policies Affecting Technological Innovation in the American Economy," Lawrence J. MacDonnell, Denver Research Institute, 1983.

2. Op. cit., p. E-7.

3. Office of Technology Assessment, Government Involvement in the Innovation Process, Washington, DC, 1978, p. 4.

4. MacDonnell, op cit., pp. E-7 to E-10.

5. For example, S.2171 introduced by Senator Dole (R-Kansas).

6. Applicable only to small businesses and not-for-profit organizations (including universities).

7. Implementing regulations to date are to be found in recent consolidated Federal Acquisition Regulations; for example, 48CFR Ch. 1, Federal Acquisition Regulations; Final Rule, 52.227-11 Patent Rights Retention by the Contractor (short form) as published in Federal Register, Volume 49, Number 63 (March 30, 1984), p. 12969 ff.

8. This was revealed in discussions with senior officials in aerospace and electronic industries. Chapman, op. cit., Appendix D.

9. Note: Anecdotal evidence from interviews in NASA Field Centers suggests that contractors may not be fully sensitive to potential commercial applications.

10. Beginning July 1981 the measure used for comparative purposes is the number of times small entities reported taking title to inventions. Not all contracts have been fully updated to include the new clause, but request for waivers from organizations affected by PL 96-517 would be accorded the same treatment as if the clause were included.

11. See Appendix C, Table 5, Items Published in Tech Briefs and Whether Patented (Volumes 5-8, 1980-84) for details on Field Center.

12. See Appendix G for a more detailed discussion of patent policy and its background.

13. Chapman, op. cit., p. xx.

14. See for example, classic discussions of "organizational environment" in Lewis G. Gawthorp, Bureaucratic Behavior in the Executive Branch (New York: Freepress, 1969); and in Francis E. Rourke, Bureaucracy, Politics, and Public Policy (Boston: Little, Brown & Company, 1969).

15. See Appendix C, Table 6, New Technology Reporting by Fiscal Years 1980-1983 for All Field Centers.

16. This letter is not a uniform practice among each of the TUOs. However, it does represent the extent of promotional activity that currently is undertaken within NASA with respect to new technology reporting.

17. See Tables 4 and 5, New Technology Items Published in NASA Tech Briefs, Volume 5-8 (1981-1984), Appendix C.

18. There was unanimous consensus among representives from aerospace contractors on this point. Their purpose is to satisfy NASA's requirements--both technically and administratively, and the principal judges for NASA as to whether or not this is being accomplished will be the NASA program or project manager or his/her equivalent for technology supporting tasks, the technical monitor at a Research Center.

19. See Table 1, "Technology Utilization, New Technology Reporting, All Years (1964-1984)," Appendix C.

CHAPTER 4
NEW TECHNOLOGY REPORTING PROGRAM EFFECTIVENESS

In judging the effectiveness of the new technology reporting system, three issues will be reviewed: (1) strong points of the current NTR system, (2) weaknesses in the current NTR system, and (3) possible means to gauge system effectiveness in the future.

Strong Points of the Current NTR System

The present new technology reporting system, as it operates, has five prominent elements of strength: (1) it is well established; (2) it produces a substantial number of worthwhile reports; (3) it operates with modest effort; (4) it exhibits the inventiveness of the Technology Utilization Officers; and (5) technical monitors who participate actively in the program are enthusiastic, demonstrating technology utilization's great potential.

NTR Is Well Established

Each of the Field Centers, in its own way, has organized and maintained the new technology reporting function in such a manner that veteran aerospace contractors handle the program as a matter of course. Project leaders or contract officers periodically are reminded of the reporting requirement, and usually are responsive to it. The larger companies have folded this program into their respective patent evaluation and reporting programs which are carefully monitored by those officials. Of course, there is another side to this particular strength, and that is, that as the process becomes regularized, it is not given the same attention as might have been the case at the outset. As new project leaders and contractors participate in the NASA program there is less and less likelihood that they will be as familiar with the value and requirements of new technology reporting as were their predecessors.

It Produces A Substantial Number of Worthwhile Reports

Table 1 in Appendix C, "New Technology Reporting 1964-1984," shows that although there have been ups and downs in reporting, the system consistently has produced 1,000 or more reports annally for potential publication in NASA Tech Briefs. Also, judging by the number of program inquiries (Table 2) and by the ratio of Technology Support Package inquiries to the number of reports (Table 10), not only have requests remained high but the quality has increased as well. This is demonstrated by the ratio of TSP inquiries to new technology reports. Admittedly, this is a rough measure, but suggestions will be made later in this chapter for means to more accurately measure program quality.

It Operates With Modest Effort

This judgment is closely tied to the first one about the new technology reporting system being well established. In those Field Centers where there is only one professional to handle most of the technology utilization functions, much of the daily work related to new technology reporting is delegated to an administrative assistant or secretary. With even this modest attention, the system continues to operate and produce relatively high levels of reporting. This demonstrates that the system can be kept operating with a relatively low effort. However, such minimum staffing will keep the system from reaching its real potential. A review of Tables 6 and 7, Appendix C ("New Technology Reporting by Fiscal Year, 1980-1983," and "New Technology Reporting in Calendar Year 1984") demonstrates that the Field Centers with the lowest staffing, also produce fewer reports. The exception to this is the Johnson Space Center; however, JSC has the advantage of the Rockwell Shuttle contract where a technology utilization group at the contractor's site (having four professionals) serves as a surrogate for the TUO at the Field Center.

The Inventiveness of the Technology Utilization Officers

This is an example of strength growing out of "weakness." The combined shortage of personnel slots and other resource constraints have brought out a substantial inventiveness among the Technology Utilization Officers. They solicit help wherever they can find it. Some have developed, and put in place, computerized tracking systems that help them provide up-to-date status on contracts, reports, publication of Tech Briefs, and related data--all of which can be used to stimulate and facilitate further reporting. The fact that the Field Centers do not all follow identical procedures gives further testimony to the fact that each TUO adapts his own approach to new technology reporting to fit the operating circumstance where he is located.

Evidence of Very Active Participation Among Some Technical Monitors

In the course of discussions with Field Center officials other than the Technology Utilization Officers, it was evident that there is an important corps of technical monitors who are enthusiastic participants in the technology utilization and technology tranfer process, and actively promote new technology reporting--either by subordinates and peers within their own laboratory setting or by contractors over which they have technical cognizance. Unfortunately, this group is quite small. It would be unrealistic to suggest that the enthusiasm exhibited by this small group of individuals can be easily or quickly generated among all technical monitors. However, the vigor and response of these highly motivated individuals show what can be done, and the substantial potential for doing considerably more.

Weaknesses in the Current NTR System

Five areas of weakness will be discussed: (1) the relative lack of promotional activities, (2) inadequate resources to meet the need, (3) the relatively low status of the technology utilization function, (4) the low

level of involvement of most technical monitors, and (5) delays in the system from point of reporting to publication and awards.

Lack of Promotional Activities

Efforts to promote the new technology reporting system, either in-house or with contractors, is virtually nonexistent. The primary exception to this is the work of the technology utilization group at Rockwell International under the Shuttle contract. Promotional and orientation literature is not only outdated, but generally no longer available. Very little is done to orient new personnel to the importance of reporting new technology. Too often, new technical monitors are briefed only by the contracting officer, with little mention of the new technology reporting requirements and, especially, the value of the program. Awareness at the contractor level, generally is weak.

Inadequate Program Resources

This is an age-old complaint that often is used to excuse what may appear to be weak performance. However, it remains true that the long term decline in staffing and other resources devoted to new technology reporting has created a circumstance where, although reporting levels may be tolerable, the potential is not being cultivated. This is primarily noticeable in the lack of promotional activities described above. These resource allocations are largely a matter of Field Center leadership discretion, as the substantial variation from one Field Center to another with respect to staffing patterns reveals.

Low Status of Technology Utilization

This factor affects the ability of the TUO to reach highest effectiveness in new technology reporting. To the extent that the TU function in a Field Center is given limited visibility and support from the Field Center leadership, the TUO has less leverage and "influence" to encourage cooperation by

others on whom he must depend to make the system operate--principally those in the technical divisions who monitor contract activity and/or have supervisory responsibility over in-house projects. TUOs have accomplished a great deal solely on their own through efforts to be helpful, to awaken interest, and to deal on a personal basis, quite apart from having much organizational influence.

Low Involvement of Technical Monitors

The active involvement of technical monitors at the Field Centers in the new technology reporting system must be characterized as generally quite low. As a rule, the vast majority of them participate in the system only on a reactive basis to the periodic "tickler" from the TUO regarding an upcoming deadline for a new technology report, or one that is overdue. The most effective new technology reporting takes place when contractor or in-house project staff are made aware of the desirability of reporting an innovation at the time it is first made. Originally, it was hoped that the study team would be able to develop a "time line" to see what the ranges and averages were with respect to the creation of an innovation and its first reporting. Preliminary inquiries revealed that awareness was so low that information could not be collected.[1]

Delays in the System

Although TUOs have reported noticeable improvement in the course of the last year, there has been substantial frustration among them about the delays from time of reporting to actual publication and awards. Such delays tend to disrupt the channels of communication and goodwill that the TUOs work to achieve in trying to stimulate and facilitate new technology reporting. Originators of the report (whether NASA engineers or contract personnel) are eager to receive feedback on the status of their reports and when they will be

published. Several TUOs expressed embarrassment at these delays--in some instances delivering award checks to the widows of some awardees, or having them forwarded to other companies as their projects had run out and they moved to other employment. Some such instances probably are inevitable in any system. However, TUOs have reported that this time span from reporting to publication, which includes awards, could be from 12 months to two and one-half years or more. The focus of this study is basically upon how to facilitate reporting--up to the decision to publish, rather than examining the actual publication and processing in the awards system following the determination that an award was justified. Much of the delay from reporting to publication has related to funding availability and the administrative processing for printing within the government system. Presumably, with the new publication arrangement, much of this delay can be eliminated.

Possible Means To Gauge System Effectiveness

One of the concerns that the study team had from the outset has been to identify information or other data that can provide useful indicators regarding the "health" of the new technology reporting system. Much of what has been collected here is qualitative, and subjective. In reviewing early reports of conferences on new technology reporting conducted by NASA, there were attempts to establish "benchmarks" or goals for new technology reporting. Some of those discussed were one innovation (report) for each man-year or fulltime equivalent of a professional scientist or engineer assigned to the project. Another suggestion was one innovation (report) per $100,000 of project money. There was no evident basis in research or history to support such benchmarks. And we remain skeptical about using such rules of thumb in judging the program. However, with some historical data, and increasing capability within the Field Center TUOs for automated tracking systems, it may

be possible in the near future to derive data that can be reasonable indicators for how the system is operating.

Long Term Trends

The present quarterly reporting system from Field Centers to NASA Headquarters provides information such as that summarized in Tables 1 and 2 of Appendix C regarding new technology reporting by contractors and by NASA in-house laboratories and Technology Utilization program inquiries. From these data it is possible to identify long-term trends. These are only very gross measurements, strongly influenced by such "outside" factors as the level of funding for major development projects, and general NASA policy guidelines regarding such projects (such as the directive to use "current technology" rather than constantly pushing technology). Such trends are useful as a first approximation even though they cannot be taken at face value regarding the "health" of the new technology reporting system.

Ratio of Items Published to New Technology Reports

These data would give a much closer approximation of the utility of the system, particulary its "quality." Because there is a rather careful screening of items as to whether or not they will be published, a relatively close relationship between items published and new technology reports would suggest a high level of quality. However, since there is an important element of delay between reporting and publication, a wave or cycle in reporting will only be reflected in publication from 12-18 months later. Therefore, gross publication data from a given period (such as a calendar year) should not be compared with new technology reporting for that same period. As the TUOs begin to have automated tracking systems, it will become possible to track individual reports to the point of publication so that Field Centers could identify a set of new technology reports from a given time period, and after following their status and disposition, could identify a publication ratio for

that set of reports. This is not practical until such systems are fully utilized throughout the Field Centers.

Time From Report To Publication

Again, with automated tracking systems coming into place, a Field Center can rather easily derive information regarding this time span and use it themselves to stimulate greater responsiveness, or report it on some basis of time to Headquarters. It has an additional advantage of also revealing whether or not reports from a particular Field Center are given either favored or unfavored treatment.

Ratio of TSP Requests to New Technology Reports

This ratio, derived for NASA as a whole, is shown in Table 10 of Appendix C. It probably is a better index of the general "health" of the reporting system, because it shows what the "customers" want and whether or not their interest is strongly stimulated by the items published in NASA Tech Briefs. Again, because of the delay between reporting of a new technology item and the request for its Technical Support Package, a more accurate measure would be to take a new technology report (by number), then track it to the number of requests for that particular TSP. Deriving such data becomes practical only as the TUOs put in place computerized tracking systems. These data could then be generated and would be useful in judging how the system operates.

The TU data system generally needs some upgrading, and recommendations are made in Chapter 5 for starting this process.

In Summary

In general, the effectiveness of NASA's new technology reporting function must be rated as quite good, given the circumstances under which it must operate. The function suffers from a number of weaknesses, the chief one

being a lack of promotional activities. But this stems largely from a combination of inadequate program resources (to achieve better effectiveness) and the relatively low status of Technology Utilization within most of NASA's organizations. In seeking program improvements, attention should be given to building upon the program's strengths--such as the inventiveness of the TUOs (each has adopted innovation approaches that should be shared), the latent potential in greater participation by the technical monitors, and the regularized pattern that has been established over two decades. Finally, the more flexible management information systems that are being made possible by computer availability to the TUOs need to be exploited for better measures of program health.

CHAPTER 4 FOOTNOTES

1. Other techniques were considered such as retroactive case study analysis, beginning with a Tech Brief and working backward. Because of a substantial delay to point of publication, with a likelihood that contractor personnel would be difficult to locate, this means was deemed too costly and time consuming.

CHAPTER 5.
OPTIONS FOR IMPROVING NEW TECHNOLOGY REPORTING

Possible options that NASA may wish to consider for improving new technology reporting are addressed in three different groups: (1) those which would take resources beyond those now dedicated to new technology reporting; (2) those which might be accomplished with little or no change in current total resources applied, although they might be shifted or reallocated; and (3) those that may be characterized as requiring general system or policy changes.

Options for Improving New Technology Reporting: Application of Additional Resources

An Expanded Awards Program

There was strong consensus in the interviews among both Field Center officials and most contractor officials that a more highly visible awards program could be an important factor in substantially encouraging new technology reporting. The most often mentioned analog is the annual IR-100 Awards program conducted by Research and Development magazine. This program is widely recognized throughout industry and government, cutting across both scientific disciplines and professional affiliations. Awards would be given, not just for reporting new technology, but for its application, with both the innovator and the individual making the innovative and significant application as candidates for these awards. They could be NASA employees, or contractor/grantee employees. Awards could be made in categories, such as major areas of technology (much like the divisions in NASA Tech Briefs). Or a set, limited number could be awarded annually. Cash awards (such as $1,000 each) and an attractive plaque, along with a recognition dinner at the Air and Space Museum presided over by the Administrator and other political and industrial luminaries, conceivably could be financed by several industrial

associations. Another alternative might be, as an off-shoot of the ICB program. However, such special "set-aside" award programs have been discouraged as part of the ICB system. It would not be unreasonable to expect companies or Field Centers whose employees were being recognized to bear the travel bill (and even banquet costs) for their "representatives."

A number of Technology Utilization Officers in the Field Centers made strong pleas for increasing the Tech Brief award from the current $100 level. Several suggested that an increase to $200-$250 would be much more attractive. Most agreed that it was not the cash per se that gave awardees the satisfaction, as much as the symbolism and visibility of being acknowledged by organizations and senior officials as having made important contributions. A simple doubling of the Tech Brief awards would cost an additional $115,000 annually based on the awards made in Fiscal Year 1984.[1]

Further use of the ICB award system, as it now exists, could be made. Reports selected for publication in NASA Tech Briefs are not reviewed consistently for further awards. In some cases a Tech Brief innovation, six to twelve months after publication, may lead to substantial payoff in secondary applications, thereby justifying further recognition. More systematic follow-up could result in better recognition and stimulate greater interest and participation in new technology reporting.

Replicate the Shuttle Contract Clause for New Technology Reporting

The unique contract that the Johnson Space Center has with Rockwell International for the prime contract work on the Space Shuttle should be judiciously employed elsewhere. This was described briefly in Chapter 2, and the results, in terms of reports generated (1,081 reports through April 1985) commends its use in other appropriate circumstances. For example, a similar provision could be placed in the prime contracts that will be awarded as the

Space Station project moves into its engineering development stages. Other potential candidates for consideration might be the large "umbrella" contracts administered by the Kennedy Space Center in support of its launch function. As noted earlier in discussing the rationale for the provision in the Rockwell Shuttle contract, anytime NASA has a very large development program where prime contracts include a substantial number of subcontracts, there is a strong likelihood that new technology reporting by the subcontractors will be forfeited because of an inadequate monitoring mechanism.

Establish a Minimum of One Fulltime Equivalent Professional Assigned to the New Technology Reporting Function at Each Field Center

Each of the NASA Field Centers has its own characteristics and management environment. Undoubtedly, each can make an argument for additional staffing. However, the new technology reporting function is sufficiently challenging and difficult so that at least one professional should be assigned this function as his/her principal responsibility. At least three Field Centers are under-staffed in this regard: Ames Research Center, Goddard Space Flight Center, and the Johnson Space Center. Goddard presents an unusual management challenge, given the fact that the new technology reporting function (for contractors) is located not in the Technology Utilization Office, but in the Patent Counsel's Office. It may be that the formal contract tracking system could continue to be the responsibility of the Patent Counsel's Office, while the orientation, liaison, and promotion activities could be vested with the Technology Utilization Office.

Provide Additional Funds for NTR Promotional Activities

During the initial years that the Technology Utilization program was being established at NASA, Field Center personnel had at least some funds for trips to major contractors in order to make them familiar with both the purpose and the requirements of the new technology reporting system. On some

occasions, contract representatives were invited to Field Center or regional meetings at which the objectives, organization and background on new technology reporting were presented and discussed. Clearly, the breadth and depth of new technology reporting are not going to be expanded without some resources devoted to promotional activities.

Some Field Center personnel, during our interviews, reported skepticism about the value of trips to major contractors, observing that reporting frequently increased noticeably after such visits, but the increased reporting was not sustained. And the "quality" of the reporting was not always improved. Beyond visits, regional symposia or other gatherings, new and interesting orientation material could be put to good use. For example, films or video tapes could be circulated to new contractors to help them understand the purpose and value of the system, as well as to encourage project personnel to be alert for new innovations. Depending upon the Field Center's relative contractor activity and its size, an addition of $5,000-$10,000 per Field Center probably could make a noticeable difference. Also, various Field Centers could act as "lead centers" to orient specific aerospace companies.

Options for Improving New Technology Reporting: No Change in Available Resources

Assuming that current resources applied to new technology reporting and related functions are fully employed, any change cannot be considered to be "without cost." Usually, this means there has to be some reallocation of effort, giving less time to one function in order to emphasize another. However, there appears to be substantial flexibility within most of the Field Centers, so that with some additional moral support from the Field Center leadership, the Technology Utilization Offices could make some simple changes that should result in better reporting of new technology. Some of these changes will require encouragement from the appropriate offices in NASA

Headquarters.

Re-establish "Common" Reporting System

The principal reporting medium is the Technology Utilization Activity Report which is made from the Field Center to the Headquarters on a quarterly basis during the calendar year. Unfortunately, over the years the Field Centers have fallen into a variety of practices which are no longer common in reporting these data. For example, most Field Centers do not report withholding payment on a contract unless the contractor has clearly refused to comply with the New Technology Clause after notification. However, at least one Center has reported withholding, on the basis of the contractor being delinquent in complying with the New Technology Clause. Another difference occurs on reportable items screened and rejected. Because some Field Centers essentially originate a reportable item, based on other information supplied by the contractor (such as a technical report) there are rarely, if ever, "reportable items" considered rejected. Presumably, this item includes only items rejected by the Field Center TU office, and not those given less than publishable rating by SRI evaluation. Another category for which data appear to be somewhat inconsistent is that covering "other" inquiries. Because the Field Centers do not have a consistent practice for recording and tracking telephone inquiries, it is not clear that this category, as reported, fully reflects the number of "other" than TSP inquiries actually received.

An Automated Data Tracking System

As NASA begins to establish the basis for an electronic mail system which would interconnect PC-based computer capability among the Technology Utilization Offices in the Field Centers, it would be helpful to establish some common elements to permit tracking contractor reports and status. Such systems already have been instituted at Ames, JPL, Marshall, and recently at

Johnson. New technology reporting status, including where reports are in the system, where action needs to be taken, etc. all could be facilitated by an exchange of information and system formats among the Technology Utilization Offices.

NTR Plans Should Be Approved Before Contract Award

Not a great deal of attention seems to be given to the review of new technology reporting plans required when a contract is awarded of $2.5 million or more. A number of Field Center officials interviewed suggested that the companies involved have a tendency to treat this requirement as "boiler plate" and give it only fleeting attention. However, the practice seems to be that contract items are negotiated and completed for contract award with the NTR plans often not submitted until after the contract has actually been awarded. To the extent that this practice is followed, NASA loses virtually any leverage for requiring substantive change in the new technology reporting plans ultimately submitted. It has been recommended by the Patent Counsel at the Goddard Space Flight Center, that NASA could retain at least some leverage if the NTR plans were required to be submitted prior to contract award. This could cause contracting organizations to have a stronger awareness of the NTR function and requirements. A related suggestion is that this provision be removed from the administrative part of the contract document and made part of the technical specifications which are more likely to be read by project engineers.

Update NTR Orientation Material

Orientation material for new contractors is virtually non-existant today. The material has not been updated since 1969, and has been long out of print. Very little illustrative material is provided by Field Center Technology Utilization Offices at the time a contract is awarded. At the very least, NASA should consider the development of a simple pamphlet with a few examples

of what constitutes new technology to be reported and a simple outline of the new technology reporting system, including means by which contractors could, with minimum effort, facilitate the new technology reporting process. Emphasis should be placed on the value of the system, the multiple channels for recognition, and awards.

TUO "Tickler" Notice to Contractors

Field Center Technology Utilization Offices have not consistently made contractors aware of the special requirements of new technology reporting, nor have they made systematic efforts to notify contractors before reporting deadlines. Samples of notifications where this has been practiced are shown in Appendix D. Even though this is an impersonal, formal system, it can stimulate useful reporting. For example, discussions at the Langley Research Center revealed that as much as 25 percent of reporting by contractors occurred in response to such "tickler" inquiries. It is important that these come from the Technology Utilization Office rather than the Contract Office because it indicates another source of interest on the part of NASA, and provides a more easily identified follow-up for telephone call or other correspondence.

NTR as a Regular Part of Technical Reviews

Awareness seems to be the fundamental, or at least initial, element in more successful new technology reporting. The more that the responsible project managers among contractors can be made aware of the new technology reporting requirements, the more likely they are to give it some attention. Interviews with contractor personnel reveal that contractor project managers will try to take that action necessary to "please" their contract officer technical representative in NASA. Thus it makes sense to encourage NASA technical monitors to make a specific point of requesting information regarding the status and level of performance for new technology reporting at

the time of periodic technical reviews with contractor personnel. These are usually face-to-face discussions held at the contractor's plant or at the Field Center. Langley Research Center recently made arrangements to have this element included in the regular contractor review sessions.

Establish Liaison Points in Field Center Technical Divisions

It would be difficult, if not impossible, for one person in the Technology Utilization Office to maintain continuing liaison with each technical monitor in a NASA Field Center. In order to provide a point of continuing liaison and responsibility for maintaining contact both with technical monitors and with progress on in-house research, Lewis, JPL, and Langley TUOs have established liaison points in the technical divisions of their respective Field Centers. This helps them to maintain a continuing point of contact and awareness with technical monitors who are key links to the contractors in establishing and maintaining awareness of NASA interest in new technology reporting. Such liaison, though formally identified, requires patience, individual effort and a personal relationship. It takes time to achieve payoff. A purely "mechanical" liaison will not be worth a great deal, although it is probably better than none at all. Serious consideration needs to be given to the relative success of these efforts and their extension to other NASA Field Centers.

Institute a Simple Means for Recording and Tracking Telephone Inquiries

Field Centers do not follow a common practice in recording or tracking TUO received telephone inquiries. To some extent, this appears to be reflected in the relatively low figures in the quarterly Technology Utilization Activities Report regarding "other inquiries." Marshall Space Flight Center recently has instituted a simple form that identifies such inquiries and their disposition. Without creating a lot of additional paperwork, this relatively simple means of recording such inquiries can provide valuable information, not

only to the Field Center TUO, but also strengthen the reporting to NASA Headquarters on such inquiries.

Make Greater Use of the ICB Awards System

Although the NASA Tech Briefs Award program is a substantial element in the Inventions and Contributions Board Award system, there seems to be limited use of the eligibility of Tech Brief awardees being considered for further ICB awards. As a group, Field Centers do not appear to consistently screen Tech Brief Award candidates for possible inclusion in the other ICB award process. For very significant innovations, ICB awards have gone as high as $25,000—a substantial stimulus and incentive to increased reporting of new technology. Obviously, substantial innovations of this type are unlikely to go unnoticed. But the further consideration of ICB awards beyond the Tech Brief award should not be overlooked as another means of stimulating new technology reporting.

Options for Improving New Technology Reporting: General System or Policy Changes

Three system or policy changes within NASA or related legislation require NASA consideration for positive action. Each has the potential for substantially improving the climate for improved new technology reporting.

Amend S.64 to Retain NASA's NTR Clause

As described in Chapter 3, and in further detail in Appendix E, recent and impending changes to U.S. patent law could substantially undercut NASA's New Technology Reporting program. The fragmentary data available to date suggest that even though PL 96-517 affects only small business and not-for-profit organizations (including universities), it appears to have had some negative effect on new technology reporting. If this is extended to medium and larger businesses, thereby including all contractors and grantees, it is possible that as much as 80 percent of current contractor reporting could

evaporate. S.64 introduced into the 99th Congress could lead to this result if it is not amended to retrieve the New Technology Reporting Clause of the Space Act. Cognizant committee staff on the Senate Judiciary Committee informally have indicated that there is an awareness of this potential problem and the desire to avoid it. However, NASA should take whatever action is required to protect the New Technology Reporting clause.

More Systematic Contact/Use of Technical Monitors

Interviews with both Field Center personnel and contractor officials demonstrated to the study team that the key link in this system is or can be the NASA technical monitor at the Field Center. Although substantial reporting does occur even where the technical monitor is not systematically involved by the Technology Utilization Office in this system, the experience of those Field Centers where the technical monitors are more closely involved, provides strong evidence that their regular participation can substantially influence improved new technology reporting. This will require patience, time, and substantial effort. Virtually all technical monitors are much more concerned with the substantive aspects of the program which they oversee, and have little time for subsidiary responsibilities. However, in those Field Centers where there have been attempts to solicit participation of the technical monitors, there are an important and notable handful who provide enthusiastic support to the technology transfer function. This number might be substantially enlarged through greater attention, cultivation by the TUO, and appropriate incentives--perhaps like the one suggested below. To be most successful, NASA must have a clear grasp of how best to appeal to the "natural" interests of technical monitors in soliciting their positive cooperation.

Establish Technology Utilization as an Element of Employee Performance Evaluation

Employees, and particularly supervisors, are very much aware of organizational priorities within the Field Center that they serve. Although most gain their greatest psychic rewards from technical successes with which they are involved, they are acutely aware of important factors which relate to the evaluation of their performance. Merely including a new element in that series of factors does not assure that it will receive adequate attention. However, to the extent that it is enforced in the actual performance evaluation process, it rarely is ignored. It was interesting to the study team to find that including technology utilization or technology transfer functions as a part of employee performance evaluation--particularly of technical supervisory personnel, has been an item of discussion at senior management levels at both Ames and Lewis Research Centers. Although nothing has yet been done to implement this, it is important to recognize that senior management in these Centers is concerned enough about the technology transfer function to give such a step consideration. If this action were given wider support among the Field Centers and by the senior management of NASA, it could have a salutory effect on the technology transfer process in general, and on new technology reporting as well.

In Conclusion

NASA has the only system in the Federal Government for capturing and disseminating new technology developed under its sponsorship of research and development. This system can be improved in many ways, some of which require additional resources and/or more senior management attention, but many of which can be instituted within the authority of the leadership of the Technology Utilization program. Perhaps the most important item requiring top management attention is that of protecting the basic authority underlying the new

technology reporting system by appropriate modification of pending patent legislation. In obtaining this attention, it may prove necessary to update senior management on the relationship of new technology reporting to NASA's Technology Utilization program, and in turn, that effort's value to NASA's programs in general.

The suggested options and actions are mutually compatible. Any single action will contribute to improving the process. However, the first and most important step undoubtedly is to gain senior management's attention to the central role played by a vigorous new technology reporting system in the success and value of NASA's broader technology utilization and technology transfer activities.

CHAPTER 5 FOOTNOTES

1. See Table 1, "Space Act Awards Program Status," Inventions and Contributions Board, FY 1984, Appendix E.

APPENDIX A

PERSONS INTERVIEWED

PERSONS INTERVIEWED

Akbay, Ismail, Technology Utilization Officer, Marshall Space Flight Center

Allen, Harrison, Deputy Director, Office of External Affairs, Lewis Research Center

Amgott, Allen, Patent Counsel-SSD, General Electric Space Systems Division

Anderson, Daniel T., Assistant Director for Patents and Licensing, Boeing Commercial Airplane Company

Badin, Leslie, Jr. Technology Utilization Officer, Rockwell International

Barr, Hardy, Patent Counsel Office, Johnson Space Center

Berard, Clement A., Jr., Staff Patent Counsel, Patent Operations, RCA David Sarnoff Research Center

Beumer, Joseph, Patent Attorney, Marshall Space Flight Center

Blanchard, Cindi, Boeing Commercial Airplane Company

Brekke, Darrell G., Patent Counsel, Ames Research Center

Bruestle, Glenn H., Director, Patent Planning & Administration, RCA David Sarnoff Research Center

Bryan, Tom, Information Electronics Systems Laboratory, Marshall Space Flight Center

Bushnell, Dennis, High Speed Aerodynamics Division, Langley Research Center

Chmylak, William, Technology Utilization Office, Johnson Space Center

Dacany, Maylene, Technology Representative, Technology Utilization Office, Ames Research Center

Dawn, Dr. Fred, Crew Systems Division, Johnson Space Center

DeArment, Philip L., Associate Patent Counsel, Martin Marietta Denver Aerospace

Duberg, Dr. John, retired, former Associate Director, Langley Research Center

Engel, Ronald, Chief of the Awards Branch and Inventions and Contributions Board, Headquarters

English, James, Manager of Technology Utilization reporting, Jet Propulsion Laboratory

Ericson, Larry, Technical Monitor, Ames Research Center

Felder, S.F. (Sandy), Chief, Technology Utilization Special Projects Office

Friedman, Donald, Technology Utilization Officer, Goddard Space Flight Center

Hendricks, Herb, Flight Electronics Division, Langley Research Center

Hess, Jane, Head, Technical Library Branch, Langley Research Center

Jackson, John, Human Factors Division, Johnson Space Center

Johnson, William G., Space Sciences Laboratory, Marshall Space Flight Center

Knoke, Anella F., New Technology Representative, Martin Marietta Denver Aerospace

Labow, Joseph, Acting Staff Director, Inventions and Contributions Board and Chief of the Waiver Branch, Headquarters

Lakey, Don, Special Projects Officer, Technology Utilization Office, Marshall Space Flight Center

Lee, William, Deputy for Technical Services, Johnson Space Center

Lizak, Ruth, New Technology Evaluation Program, Technology and Innovation Management Center, SRI International

Loftin, Larry, retired, former Director of Aeronautics, Langley Research Center

Matthews, Marvin, Patent Counsel, Johnson Space Center

Miller, Stanley, Technology Utilization Officer, Ames Research Center

Musial, Norman T., Patent Counsel, Lewis Research Center

Osborn, Howard, Patent Counsel, Langley Research Center

Pryor, Charles, New Technology Representative and Contract Administrator, Northrup Services Inc. (a service and R&D contractor with Johnson Space Center) (telephone interview)

Richardson, John, New Technology Reporting Officer, Marshall Space Flight Center

Roe, Fred, Control Electronics Branch, Information Electronics Systems Laboratory, Marshall Space Flight Center

Runyon, Harry, retired, former Chief, Structures and Dynamics Division, Langley Research Center

St. Clair, Dr. Terry, Materials Division, Langley Research Center

Samos, John, Head, Technology Utilization Office, Langley Research Center

Scheckman, Howard D., Office of Patents and Technology Utilization, Jet Propulsion Laboratory

Schneider, Dr. Robert, Chief Separation Processes Branch, Space Sciences Laboratory, Marshall Space Flight Center

Seward, Sue, Reference Librarian, Langley Research Center

Shoemaker, C.J., New Technology Reporting Representative, Langley Research Center

Smith, Aubrey, Technology Utilization Office, Jet Propulsion Laboratory

Tresansky, John O., Patent Counsel, Goddard Space Flight Center

Wofford, Leon, Chief Patent Counsel, Marshall Space Flight Center

APPENDIX B

NTR CLAUSE AND PATENT CLAUSES (JSC)

Key Reporting Provisions

New Technology Clause (April 1984)

Paragraph	Remarks
(a)	Definitions.
	"Made," as used in this clause, means conception or first actual reduction to practice.
	"Reportable Item." Note "... whether or not ... patentable or otherwise protectible under Title 35 of the United States Code,"
(e)(1)	"...establish and maintain active and effective procedures...."
(e)(2)	"The Contractor will disclose each reportable item....within 2 months after the inventor discloses it in writing to Contractor personnel responsible for the administration of this New Technology clause or, if earlier, within 6 months after the Contractor becomes aware that a reportable item has been made, but in any event for subject inventions before any on sale, public use, or publication of such invention known to the Contractor."
	(It will be appreciated if each such report is submitted with one original and four copies if this does not constitute an undue burden.)
(e)(3)(i)	Interim reports are to be furnished at least every 12 months. Requirements for these reports are detailed in this paragraph.
(e)(3)(ii)	A final report is to be furnished within 3 months after completion of the contract work. Requirements for the report are detailed in this paragraph.
(g)(1)	Funds may be withheld for non-compliance
(g)(3)	Final payment...shall not be made before delivery of all disclosures of Reportable Items and an acceptable final report.
(h)(1)	Inclusion of the applicable patent rights clause in subcontracts.
(h)(4)	Notification of the award of any subcontract containing a patent rights clause.

(a) Definitions.

"Administrator," as used in this clause, means the Administrator of NASA or duly authorized representative.

"Contract," as used in this clause, means any actual or proposed contract, agreement, understanding, or other arrangement, and includes any assignment, substitution of subcontract executed or entered into thereunder.

"Made," as used int his clause, means conception or first actual reduction to practice.

"Nonprofit organization," as used in this clause, means a domestic university or other institution of higher education or an organization of the type described in section 501(c)(3) of the Internal Revenue Code of 1954 (26 U.S.C. 501(c)) and exempt from taxation under section 501(a) of the Internal Revenue Code (26 U.S.C. 501(a)), or any domestic nonprofit scientific or educational organization qualified under a State nonprofit organization statute.

"Practical application," as used in this clause, means to manufacture, in the case of a composition or product; to practice, in the case of a process or method; or to operate, in case of a machine or system; and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are, to the extent permitted by law or Government regulations, available to the public on reasonable terms.

"Reportable item," as used in this clause, means any invention, discovery, improvement, or innovation of the Contractor, whether or not the same is or may be patentable or otherwise protectible under Title 35 of the United States Code, conceived or first actually reduced to practice in the performance of any work done under this contract or in the performance of any work that is reimbursable under any clause in this contract providing for reimbursement of costs incurred prior to the effective date of this contract.

"Small business firm," as used in this clause means a domestic small business concern as defined at 15 U.S.C. 632 and implementing regulations of the Administrator of the Small Business Administration. (For the purpose of this definition, the size standard contained in 13 CFR 121.3-8 for small business contractors and in 13 CFR 121.3-12 for small business subcontractors will be used.)

"Subject invention," as used in this clause, means any reportable item which is or may be patentable or otherwise protectible under Title 35 of the United States Code.

(b) Allocation of principal rights.

(1) Presumption of title.

(i) Any reportable item that the Administrator considers to be a subject invention shall be presumed to have been made in the manner specified in paragraph (1) or (2) of Section 305(a) of the National Aeronautics and Space Act of 1958 (43 U.S.C. 2457(a)) (hereinafter called "the Act"), and the above presumption shall be conclusive unless at the time of reporting the reportable item the Contractor submits to the Contracting Officer a written statement, containing supporting details, demonstrating that the reportable item was not made in the manner specified in paragraph (1) or (2) of Section 305(a) of the Act.

(ii) Regardless of whether title to a given subject invention would otherwise be subject to an advance waiver or is the subject of a petition for waiver, the Contractor may nevertheless file the statement described in subdivision (i) above. The Administrator will review the information furnished by the Contractor in any such statement and any other available information

relating to the circumstances surrounding the making of the subject invention and will notify the Contractor whether the Administrator has determined that the subject invention was made in the manner specified in paragraph (1) or (2) of Section 305(a) of the Act.

(2) Property rights in subject inventions. Each subject invention for which the presumption of subdivision (1)(i) above is conclusive, or for which there has been a determination that it was made in the manner specified in paragraph (1) or (2) of Section 305(a) of the Act, shall be the exclusive property of the United States as represented by the National Aeronautics and Space Administration unless the Administrator waives all or any part of the rights of the United States, as provided in subparagraph (3) below.

(3) Waiver of rights.

(i) Section 305(f) of the Act provides for the promulgation of regulations by which the Administrator may waive the rights of the United States with respect to any invention or class of inventions made or that may be made under conditions specified in paragraph (1) or (2) of Section 305(a) of the Act. The promulgated NASA Patent Waiver Regulations, 14 CFR Section 1245, Subpart 1, have adopted the Presidential Memorandum on Government Patent Policy of February 18, 1983, as a guide in acting on petitions (requests) for such waiver of rights.

(ii) As provided in 14 CFR 1245, Subpart 1, Contractors may petition, either prior to execution of the contract or within 30 days after execution of the contract, for advance waiver of rights to any or all of the inventions that may be made under a contract. If such a petition is not submitted, or if submitted it is denied, the Contractor (or an employee inventor of the Contractor) may petition for waiver of rights to an identified subject invention within 8 months of first disclosure of the invention pursuant to subparagraph (e)(2) below, or within such longer period as may be authorized in accordance with 14 CFR 1245.105.

(c) Minimum rights reserved by the Government.

(1) With respect to each subject invention for which a waiver of rights is applicable pursuant to 14 CFR Section 1245, Subpart 1, the Government reserves--

(i) An irrevocable, nonexclusive, nontrasferable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government pursuant to any treaty or agreement with the United States; and

(ii) Such other rights as set forth in 14 CFR 1245.107.

(2) Nothing contained in this paragraph (c) shall be deemed to grant to the Government any rights with respect to any invention other than a subject invention.

(d) Minimum rights to the Contractor.

(1) The Contractor is hereby granted a revocable, nonexclusive, royalty-free license in each patent application filed in any country on a subject invention and any resulting patent in which the Government acquires title, unless the Contractor fails to disclose the subject invention within the times specified in subparagraph (e)(2) below. The Contractor's license extends to its domestic subsidiaries and affiliates, if any, within the corporate structure of which the Contractor is a party and includes the right to grant sublicenses of the same scope to the extent the Contractor was legally obligated to do so at the time the contract was awarded. The license is transferable only with the approval of the Administrator except when transferred to the successor of that part of the Contractor's business to which the invention pertains.

(2) The Contractor's domestic license may be revoked or modified by the Administrator to the extent necessary to achieve expenditious practical application of the subject invention pursuant to an application for an exclusive license submitted in accordance with 14 CFR 1245, Subpart 2, Licensing of NASA Inventions. This license will not be revoked in that field of use or the geographical areas in which the Contractor has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of the Administrator to the extent the Contractor, its licensees, or its domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country.

(3) Before revocation or modification of the license, the Contractor will be provided a written notice of the Administrator's intention to revoke or modify the license, and the Contractor will be allowed 30 days (or such other time as may be authorized by the Administrator for good cause shown by the Contractor) after the notice to show cause why the license should not be revoked or modified. The Contractor has the right to appeal, in accordance with 14 CFR 1245.211, any decision concerning the revocation or modification of its license.

(e) Invention identification, disclosures, and reports.

(1) The Contractor shall establish and maintain active and effective procedures to assure that reportable items are promptly identified and disclosed to Contractor personnel responsible for the administration of this New Technology clause within 6 months of conception and/or first actual reduction to practice, whichever occurs first in the performance of work under this contract. These procedures shall include the maintenance of laboratory notebooks or equivalent records and other records as are reasonably necessary to document the conception and/or the first actual reduction to practice of the reportable items, and records that show that the procedures for identifying and disclosing reportable items are followed. Upon request, the Contractor shall furnish the Contracting Officer a description of such procedures for evaluation and for determination as to their effectiveness.

(2) The Contractor will disclose each reportable item to the Contracting Officer within 2 months after the inventor discloses it in writing to Contractor personnel responsible for the administration of this New Technology clause or, if earlier, within 6 months after the Contractor becomes aware that a reportable item has been made, but in any event for subject inventions before any on sale, public use, or publication of such invention known to the Contractor. The disclosure to the agency shall be in the form of a written report and shall identify the contract under which the reportable item was made and the inventor(s) or innovator(s). It shall be sufficiently complete in technical detail to convey a clear understanding, to the extent known at the time of the disclosure, of the nature, purpose, operation, and physical, chemical, biological, or electrical characteristics of the reportable item. The disclosure shall also identify any publication, on sale, or public use of any subject invention and whether a manuscript describing such invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after disclosure to the agency, the Contractor will promptly notify the agency of the acceptance of any manuscript desribing a subject invention for publication or of any on sale or public use planned by the Contractor for such invention.

(3) The Contractor shall furnish the Contracting Officer the following:

(i) Interim reports every 12 months (or such longer period as may be specified by the Contracting Officer) from the date of the contract, listing reportable items during that period, and certifying that all reportable items

have been disclosed (or that there are no such inventions) and that the procedure required by subparagraph (3) (1) above have been followed.

(ii) A final report within 3 months after completion of the contracted work, listing all reportable items or certifying that there were no such reportable items, and listing all subcontracts at any tier containing a patent rights clause or certifying that there were no such subcontracts.

(4) The Contractor agrees, upon written request of the Contracting Officer, to furnish additional technical and other information available to the Contractor as is necessary for the preparation of a patent application, and to execute all papers necessary to file patent applications on subject inventions and to establish the Government's rights in the subject inventions.

(5) The Contractor agrees, subject to paragraph 27.302(i), of the Federal Acquisition Regulation (FAR), that the Government may duplicate and disclose subject invention disclosures and all other reports and papers furnished or required to be furnished pursuant to this clause.

(f) Examination of records relating to inventions. (1) The Contracting Officer or any authorized representative shall, until 3 years after final payment under this contract, have the right to examine any books (including laboratory notebooks), records, and documents of the Contractor relating to the conception or first actual reduction to practice of inventions in the same field of technology as the work under this contract to determine whether--

(i) Any such inventions are subject inventions;

(ii) The Contractor has established and maintained the procedures required by subparagraph (e)(1) of this clause; and

(iii) The Contractor and its inventors have complied with the procedure.

(2) If the Contracting Officer learns of an unreported Contractor invention that the Contracting Officer believes may disclose the invention to the agency for a determination of ownership rights.

(3) Any examination of records under this paragraph will be subject to appropriate conditions to protect the confidentiality of the information involved.

(g) Withholding of payment (this paragraph does not apply to subcontracts). (1) Any time before final payment under this contract, the Contracting Officer may, in the Government's interest, withhold payment until a reserve not exceeding $50,000 or 5 percent of the amount of this contract, whichever is less, shall have been set aside if, in the contracting Officer's opinion, the Contractor fails to--

(i) Establish, maintain, and follow effective procedures for identifying and disclosing reportable items pursuant to subparagraph (e)(1) above;

(ii) Disclose any reportable items pursuant to subparagraph (e)(2) above;

(iii) Deliver acceptable interim reports pursuant to subdivision (e)(3)(i) above; or

(iv) Provide the information regarding subcontracts pursuant to subparagraph (h)(4) below.

(2) Such reserve or balance shall be withheld until the Contracting Officer has determined that the Contractor has rectified whatever deficiencies exist and has delivered all reports, disclosures, and other information required by this clause.

(3) Final payment under this contract shall not be made before the Contractor delivers to the Contracting Officer all disclosures of reportable items required by subparagraph (e)(3)(ii) above.

(4) The Contracting Officer may decrease or increase the sums withheld up to the maximum authorized above. No amount shall be withheld under this .op

paragraph while the amount specified by this paragraph is being withheld under other provisions of the contract. The withholding of any amount or the subsequent payment thereof shall not be construed as a waiver of any Government rights.

(h) Subcontracts.

(1) Unless otherwise authorized or directed by the Contracting Officer, the Contractor shall--

(i) Include this clause (suitably modified to identify the parties) in any subcontract hereunder (regardless of tier) with other than a small business firm or nonprofit organization for the performance of experimental, developmental, or research work; and

(ii) Include the clause at FAR 52.227-11 (suitably modified to identify the parties) in any subcontract hereunder (regardless of tier) with a small business firm or nonprofit organization for the performance of experimental, developmental, or research work.

(2) In the event of a refusal by a prospective subcontractor to accept such a clause the Contractor—

(i) Shall promptly submit a written notice to the Contracting Officer setting forth the subcontractor's reasons for such refusal and other pertinent information that may expedite disposition of the matter; and

(ii) Shall not proceed with such subcontract without the written authorization of the Contracting Officer.

(3) In the case of subcontracts at any tier, the agency, subcontractor, and Contractor agree that the mutual obligations of the parties created by this clause constitute a contract between the subcontractor and NASA with respect to those matters covered by this clause.

(4) The Contractor shall promptly notify the Contracting Officer in writing upon the award of any subcontract at any tier containing a patent rights clause by identifying the subcontractor, the applicable patent rights clause, the work to be performed under the subcontract, and the dates of award and estimated completion. Upon request of the Contracting Officer, the Contractor shall furnish a copy of such subcontract, and, no more frequently than annually, a listing of the subcontracts that have been awarded.

(5) The subcontractor will retain all rights provided for the Contractor in the clause of subdivision (l)(i) or (l)(ii) above, whichever is included in the subcontract, and the Contractor will not, as part of the consideration for awarding the subcontract, obtain rights in the subcontractor's subject inventions.

(i) Preference for United States industry. Unless provided otherwise, no Contractor that receives title to any subject invention and no assignee of any such Contractor shall grant to any person the exclusive right to use or sell any subject invention in the United States unless such person agrees that any products embodying the subject invention will be manufactured substantially in the United States. However, in individual cases, the requirement may be waived by the Administrator upon a showing by the Contractor or assignee that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the United States or that under the circumstances domestic manufacture is not commercially feasible.

PATENT RIGHTS--RETENTION BY THE CONTRACTOR (SHORT FORM) (APR 1984)

(a) Definitions.

"Invention" means any invention or discovery which is or may be patentable or otherwise protectable under Title 35 of the United States Code.

"Subject invention" means any invention of the Contractor conceived or first actually reduced to practice in the performance of work under this contract.

"Practical application" means to manufacture in the case of a composition or product, to practice in the case of a process or method, or to operate in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are, to the extent permitted by law or Government regulations, available to the public on reasonable terms.

"Made," when used in relation to any invention, means the conception or first actual reduction to practice of such invention.

"Small business firm" means a small domestic business concern as defined at Section 2 of Public Law 85-536 (15 U.S.C. 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of this clause, the size standards for small business concerns involved in Government procurement and subcontracting at 13 CFR 121.3-8 and 13 CFR 121.3-12, respectively, will be used.

"Nonprofit organization" means a domestic university or other institution of higher education or an organization of the type described in section 501(c)(3) of the Internal Revenue Code of 1954 (26 U.S.C. 501(c)) and exempt from taxation under section 501(a) of the Internal Revenue Code (26 U.S.C. 501(a)) or any domestic nonprofit scientific or educational organization qualified under a state nonprofit organization statute.

(b) Allocation of principal rights. The contractor may retain the entire right, title, and interest throughout the world to each subject invention subject to the provisions of this clause and 35 U.S.C. 203. With respect to any subject invention in which the Contractor retains title, the Federal Government shall have a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the subject invention throughout the world.

(c) Invention disclosure, election of title, and filing of patent applications by Contractor.

(1) The Contractor shall disclose each subject invention to the Contracting Officer within 2 months after the inventor discloses it in writing to Contractor personnel responsible for patent matters. The disclosure to the Contracting Officer shall be in the form of a written report and shall identify the contract under which the invention was made and the inventor(s). It shall be sufficiently complete in technical detail to convey a clear understanding, to the extent known at the time of the disclosure, of the nature, purpose, operation, and physical, chemical, biological, or electrical characteristics of the invention. The disclosure shall also identify any publication, on sale, or public use of the invention and whether a manuscript describing the invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after disclosure to the Contracting Officer, the Contractor shall promptly notify the Contracting Officer of the acceptance of any manuscript describing the invention for publication or of any on sale or public use planned by the Contractor.

(2) The Contractor shall elect in writing whether or not to retain title to any such invention by notifying the Federal agency within 12 months of disclosure; provided, that in any case where publication, on sale, or public use has initiated the 1-year statutory period wherein valid patent protection can still be

obtained in the United States, the period of election of title may be shortened by the agency to a date that is no more than 60 days prior to the end of the statutory period.

(3) The Contractor shall file its initial patent application on an elected invention within 2 years after election or, if earlier, prior to the end of any statutory period wherein valid patent protection can be obtained in the United States after a publication, on sale, or public use. The Contractor will file patent applications in additional countries within either 10 months of the corresponding initial patent application or 6 months from the date permission is granted by the Commissioner of Patents and Trademarks to file foreign patent applications where such filing has been prohibited by a Secrecy Order.

(4) Requests for extension of the time for disclosure to the Contracting Officer, election, and filing may, at the discretion of the funding Federal agency, be granted.

(d) Conditions when the Government may obtain title.
The Contractor shall convey to the Federal agency, upon written request, title to any subject invention--

(1) If the Contractor fails to disclose or elect the subject invention within the times specified in paragraph (c) above, or elects not to retain title (the agency may only request title within 60 days after learning of the Contractor's failure to report or elect within the specified times);

(2) In those countries in which the Contractor fails to file patent applications within the times specified in paragraph (c) above; provided, however, that if the Contractor has filed a patent application in a country after the times specified in paragraph (c) above, but prior to its receipt of the written request of the Federal agency, the Contractor shall continue to retain title in that country; or

(3) In any country in which the Contractor decides not to continue the prosecution of any application for, to pay the maintenance fees on, or defend in reexamination or opposition proceeding on, a patent on a subject invention.

(e) Minimum rights to contractor. (1) The contractor shall retain a non-exclusive, royalty-free license throughout the world in each subject invention to which the Government obtains title except if the Contractor fails to disclose the subject invention within the times specified in paragraph (c) above. The Contractor's license extends to its domestic subsidiaries and affiliates, if any, within the corporate structure of which the Contractor is a part and includes the right to grant sublicenses of the same scope to the extent the Contractor was legally obligated to do so at the time the contract was awarded. The license is transferable only with the approval of the funding Federal agency except when transferred to the successor of that part of the Contractor's business to which the invention pertains.

(2) The Contractor's domestic license may be revoked or modified by the funding Federal agency to the extent necessary to achieve expeditious practical application of the subject invention pursuant to an application for an exclusive license submitted in accordance with applicable provisions in the Federal Property Management Regulations and agency licensing regulations (if any). This license shall not be revoked in that field of use or the geographical areas in which the Contractor has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of the funding Federal agency to the extent the Contractor, its licensees, or its domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country.

(3) Before revocation or modification of the license, the funding Federal agency shall furnish the Contractor a written notice of its intention to revoke or modify the license, and the Contractor shall be allowed 30 days (or such other time as may be authorized by the funding Federal agency for good cause shown by the Contractor) after the notice to show cause why the license should not be revoked or modified. The Contractor has the right to appeal, in accordance with applicable agency licensing regulations (if any) and the Federal Property Management Regulations concerning the licensing of Government-owned inventions, any decision concerning the revocation or modification of its license.

(f) Contractor action to protect the Government's interest. (1) The Contractor agrees to execute or to have executed and promptly deliver to the Federal agency all instruments necessary to (i) establish or confirm the rights the Government has throughout the world in those subject inventions to which the Contractor elects to retain title, and (ii) convey title to the Federal agency when requested under paragraph (d) above, and to enable the Government to obtain patent protection throughout the world in that subject invention.

(2) The Contractor agrees to require, by written agreement, its employees, other than clerical and nontechnical employees, to disclose promptly in writing to personnel identified as responsible for the administration of patent matters and in a format suggested by the Contractor each subject invention made under contract in order that the Contractor can comply with the disclosure provisions of paragraph (c) above, and to execute all papers necessary to file patent applications on subject inventions and to establish the Government's rights in the subject inventions. This disclosure format should require, as a minimum, the information required by subparagraph (c)(1) above. The Contractor shall instruct such employees through employee agreements or other suitable educational programs on the importance of reporting inventions in sufficient time to permit the filing of patent applications prior to U.S. or foreign statutory bars.

(3) The Contractor shall notify the Federal agency of any decision not to continue the prosecution of a patent application, pay maintenance fees, or defend in a reexamination or opposition proceeding on a patent, in any country, not less than 30 days before the expiration of the response period required by the relevant patent office.

(4) The Contractor agrees to include, within the specification of any United States patent application and any patent issuing thereon covering a subject invention, the following statement: "This invention was made with Government support under (identify the contract) awarded by (identify the Federal agency). The Government has certain rights in this invetnion."

(5) The Contractor shall furnish the Contracting Officer the following:

(i) Interim reports every 12 months (or such longer period as may be specified by the Contracting Officer) from the date of the contract, listing subject inventions during that period and certifying that all subject inventions have been disclosed or that there are no such inventions.

(ii) A final report, within 3 months after completion of the contracted work, listing all subject inventions or certifying that there were no such inventions, and listing all subcontracts at any tier containing a patent rights clause or certifying that there were no such subcontracts.

(6) The Contractor shall promptly notify the Contracting Officer in writing upon the award of any subcontract at any tier containing a patent rights clause by identifying the subcontractor, the applicable patent rights clause, the work to be performed under the subcontract, and the dates of award and estimated completion.

Upon request of the Contracting Officer, the Contractor shall furnish a copy of such subcontract, and no more frequently than annually, a listing of the subcontracts that have been awarded.

(7) The Contractor shall provide, upon request, the filing date, serial number and title, a copy of the patent application (including an English language version if filed in a language other than English), and patent number and issue date for any subject invention for which the Contractor has retained title.

(8) Upon request, the Contractor shall furnish the Government an irrevocable power to inspect and make copies of the patent application file.

(g) Subcontracts. (1) The Contractor shall include this clause (52.227-11 of the Federal Acquisition Regulation (FAR)), suitably modified to identify the parties, in all subcontracts, regardless of tier, for experimental, developmental, or research work to be performed by a small business firm or nonprofit organization. The subcontractor shall retain all rights provided for the Contractor in this clause, and the Contractor shall not, as part of the consideration for awarding the subcontract, obtain rights in the subcontractor's subject inventions.

(2) In the case of subcontracts, at any tier, when the prime award with the Federal agency was a contract (but not a grant or cooperative agreement), the agency, subcontractor, and the Contractor agree that the mutual obligations of the parties created by this clause constitute a contract between the subcontractor and the Federal agency with respect to those matters covered by this clause.

(h) Reporting utilization of subject inventions. The Contractor agrees to submit on request periodic reports no more frequently than annually on the utilization of a subject invention or on efforts at obtaining such utilization that are being made by the Contractor or its licensees or assignees. Such reports shall include information regarding the status of development, date of first commercial sale or use, gross royalties received by the Contractor, and such other data and information as the agency may reasonably specify. The Contractor also agrees to provide additional reports as may be requested by the agency in connection with any march-in proceedings undertaken by the agency in accordance with paragraph (j) of this clause. To the extent data or information supplied under this paragraph is considered by the Contractor, its licensee, or assignee to be priviledged and confidential and is so marked, the agency agrees that, to the extent permitted by law, it shall not disclose such information to persons outside the Government.

(i) Preference for United States industry. Notwithstanding any other provision of this clause, the Contractor agrees that neither it nor any assignee will grant to any person the exclusive right to use or sell any subject invention in the United States unless such person agrees that any products embodying the subject invention will be manufactured substantially in the United States. However, in individual cases, the requirement for such an agreement may be waived by the Federal agency upon a showing by the Contractor or its assignee that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the United States or that under the circumstances domestic manufacture is not commercially feasible.

(j) March-in rights. (1) The Contractor agrees that with respect to any subject invention in which it has acquired title, the Federal agency has the right in accordance with the procedures in FAR 27.304-1(g) to require the Contractor, an assignee, or exclusive licensee of a subject invention to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to a responsible applicant or applicants, upon terms that are reasonable under the circumstances, and if the Contractor, assignee, or exclusive licensee refuses such a request, the Federal agency has the right to grant such a license itself if the Federal agency determines that--

(i) Such action is necessary because the Contractor or assignee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of the subject invention in such field of use;

(ii) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by the Contractor, assignee, or their licensees;

(iii) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by the Contractor, assignee, or licensees; or

(iv) Such action is necessary because the agreement required by paragraph (i) of this clause has not been obtained or waived or because a licensee of the exclusive right to use or sell any subject invention in the United States is in breach of such agreement.

(k) Special provisions for contracts with nonprofit organizations. If the Contractor is a nonprofit organization, it agrees that--

(1) Rights to a subject invention in the United States may not be assigned without the approval of the Federal agency, except where such assignment is made to an organization which has as one of its primary functions the management of inventions and which is not, itself, engaged in or does not hold a substantial interest in other organizations engaged in the manufacture or sale of products or the use of processes that might utilize the invention or be in competition with embodiments of the invention (provided, that such assignee will be subject to the same provisions as the Contractor);

(2) The Contractor may not grant exclusive licenses under United States patents or patent applications in subject inventions to persons other than small business firms for a period in excess of the earlier of--

(i) Five years from first commercial sale or use of the invention; or

(ii) Eight years from the date of the exclusive license excepting that time before regulatory agencies necessary to obtain premarket clearance, unless on a case-by-case basis, the Federal agency approves a longer exclusive license. If exclusive field-of-use licenses are granted, commercial sale or use in one field of use will not be deemed commercial sale or use as to other fields of use, and a first commercial sale or use with respect to a product of the invention will not be deemed to end the exclusive period to different subsequent products covered by the invention;

(3) The Contractor shall share royalties collected on a subject invention with the inventor; and

(4) The balance of any royalties or income earned by the Contractor with respect to subject inventions, after payment of expenses (including payments to inventors) incidental to the administration of subject inventions, will be utilized for the support of scientific research or education.

(l) Communications. Reserved.

APPENDIX C

DATA TABLES

1. New Technology, NASA and Contractors, By Year
2. TSP and General Inquiries, By Year
3. New Technology Reporting, By Field Center
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4. Tech Briefs Published, Volumes 5-8 (1981-1984),
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8. Sources of New Technology Reporting (Evaluation), 1980-1982
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10. Ratio: New Technology Requests to New Technology Reporting
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12. Reportable Items Received, 1980-1984
13. Reportable Items Screened and Rejected, 1980-1984

TABLE 1.
TECHNOLOGY UTILIZATION
NEW TECHNOLOGY REPORTING
1964-1984
(Field Centers and Headquarters)

Calendar Year	Contractor (includes JPL)	NASA (inc. HQ not JPL)	Total
1964	311	427	738
1965	864	218	1,082
1966	2,996	328	3,324
1967	3,631	477	4,108
1968	4,038	642	4,680
1969	3,263	664	3,927
1970	3,121	473	3,594
1971	2,475	430	2,905
1972	2,609	369	2,978
1973	1,560	338	1,898
1974	1,089	348	1,437
1975	1,201	359	1,560
1976	1,326	497	1,823
1977	1,354	562	1,916
1978	1,473	305	1,778
1979	1,475	314	1,789
1980	1,140	488	1,628
1981	1,085	543	1,628
1982	919	491	1,410
1983	840	381	1,221
1984	712	362	1,074
Total	37,482	9,016	46,498

*Data by Technology Utilization Division, Office of Commercial Programs, NASA Headquarters, April 1985.

TABLE 2.
TECHNOLOGY UTILIZATION PROGRAM INQUIRIES
1964-1984
(Field Centers and Headquarters)*

CALENDAR YEAR	TSP	GENERAL	TOTAL
1964	3,507	**	3,507
1965	6,105	**	6,105
1966	8.268	**	8,268
1967	9,878	4,864	14,742
1968	13,451	10,300	23,751
1969	9,452	9,385	18,837
1970	16,996	12,299	29,295
1971	51,731	20,351	72,082
1972	68,144	19,011	87,155
1973	40,485	12,962	53,447
1974	32,108	43,423	75,531
1975	28,105	16,645	44,750
1976	53,602	39,248	92,850
1977	125,586	35,531	161,117
1978	63,312	28,344	91,656
1979	190,325	38,501	228,826
1980	212,045	27,908	239,953
1981	151,866	39,347	191,213
1982	78,180	41,834	120,014
1983***	54,415	37,632	92,047
1984	71,522	25,933	97,455
TOTAL	1,289,083	463,518	1,752,601

*Data by Technology Utilization Division, Office of Commercial Programs, NASA Headquarters, April 1985.
**General Inquiries not recorded 1964-66.
***Only 3 issues of NASA Tech Briefs was published in 1983.

TABLE 3.
COMPARISON OF REPORTABLE ITEMS RECEIVED BY NASA
FIELD CENTERS, JULY 1979-JUNE 1981 AND JULY 1981-JUNE 1983

Center	NTR Items Received		Reportable Items Received: July 1979-June 1981	Reportable Items Received: July 1981-June 1983	Percent Change
Marshall		In-House	97	79	- 20.6%
		Contractor	546	309	- 43.4%
Lewis		In-House	137	105	- 23.4%
		Contractor	167	184	+ 10.2%
Langley		In-House	606	469	- 22.6%
		Contractor	126	114	- 9.5%
Kennedy		In-House	9	24	+167.7%
		Contractor	47	56	+ 19.1%
Johnson		In-House	43	27	- 37.2%
		Contractor	611	468	- 23.4%
JPL		In-House	0	0	--
		Contractor	723	547	- 24.3%
Goddard		In-House	84	74	- 11.9%
		Contractor	105	59	- 43.8%
Ames		In-House	53	172	+224.5%
		Contractor	45	63	+ 40.0%
Subtotal		In-House	1,029	950	- 7.79%
		Contractor	2,370	1,800	- 24.0%
Total			3,399	2,750	- 19.1%

TABLE 4.
NEW TECHNOLOGY ITEMS PUBLISHED
IN NASA TECH BRIEFS, VOLUMES 5-8
(1981-1984)

Source	New Technology Items Published				
	Patented		Not Patented		Total
	No.	%	No.	%	No.
In-House	275	61.8	170	38.2	445
Contractor	280	21.1	1,045	78.9	1,325
Total	555	31.4	1,215	68.6	1,770

TABLE 5.
ITEMS PUBLISHED IN TECH BRIEFS BY SOURCE AND WHETHER PATENTED
(Volumes 5-8, 1981-84)

Field Center		Volume 5		Volume 6		Volume 7		Volume 8 tech briefs		Volume 8 mini briefs		Total per field center excl. mini br.		Total per field center incl. mini br.	
		Pat	Non-Pat	Pat	Non-Pat	Pat	Non-Pat	Pat	Non-Pat	Pat	Non-Pat	Pat	Non-Pat	Pat	Non-Pat
Ames	in-house	4	1	10	3	5	4	10	3	2	3	29	11	31	14
	contractor	0	1	7	6	1	3	1	1	0	1	9	11	9	12
Dryden	in-house	2	0	1	1	1	0	0	0	0	0	4	1	4	1
	contractor	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goddard	in-house	9	9	14	7	11	1	13	1	0	0	47	18	47	18
	contractor	1	5	2	3	8	2	5	2	1	0	16	12	17	12
Johnson	in-house	4	3	7	1	6	2	3	4	0	0	20	10	20	10
	contractor	17	77	8	66	17	53	2	5	0	8	44	201	44	209
Kennedy	in-house	2	0	2	0	1	0	0	1	1	3	5	1	6	4
	contractor	4	1	4	10	2	6	1	3	1	11	11	20	12	31
Langley	in-house	34	19	20	13	21	17	9	8	2	4	84	57	86	61
	contractor	5	4	3	8	1	9	3	5	0	1	12	26	12	27
Lewis	in-house	13	11	5	10	3	4	2	2	0	0	23	27	23	27
	contractor	1	1	0	1	2	2	0	2	0	0	3	6	3	6
Marshall	in-house	8	3	14	4	8	5	13	5	15	18	43	17	58	35
	contractor	14	27	19	36	11	29	11	46	8	80	55	138	63	218
Headquarters	in-house	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	contractor	0	2	0	0	0	0	0	0	0	1	0	2	0	3
JPL	in-house	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	contractor	27	62	11	97	13	136	22	89	47	143	73	384	120	527
Wallops	in-house	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	contractor	0	0	0	0	0	0	0	0	0	0	0	0	0	0

				Total			Total			Total			Total			Total			Total			Total
Total per volume excluding JPL	in-house	76	46	122	73	39	112	56	33	89	50	24	74	20	28	48	255	142	397	275	170	445
	contractor	42	118	160	43	130	173	42	104	146	23	64	87	10	102	112	150	416	566	160	518	678
	total	118	164		116	169		98	137		73	88		30	130		405	558		435	688	1123
Total per volume including JPL	in-house	76	46		73	39		56	33		50	24		20	28		255	142	397	275	170	445
	contractor	69	180		54	227	281	55	240	295	45	153	198	57	245	302	223	800	1023	280	1045	1325
	total	145	226	249	127	266		111	273		95	177		77	273		478	942	1420	555	1215	1770

TABLE 8.

NEW TECHNOLOGY REPORTING BY FISCAL YEAR (Old System July-June) 1980-1983

TOTAL FOR ALL FIELD CENTERS

Old Fiscal Year	1980					1981					1982					1983					
Calendar Year	(1979)		(1980)			(1980)		(1981)			(1981)		(1982)			(1982)		(1983)			
Quarters	3	4	1	2	Total	3	4	1	2	Total	3	4	1	2	Total	3	4	1	2	Total	Grand Total
Reportable Items Received:																					
In-House	141	114	130	97	482	121	130	167	129	547	131	115	153	129	528	106	103	103	110	422	
Contractor	316	302	246	298	1162	329	262	304	313	1208	249	204	273	230	956	176	226	229	213	844	
Total	457	416	376	395	1644	450	392	471	442	1755	380	319	426	359	1484	282	329	332	323	1266	6149
Reportable Items Screened and Rejected																					
In-House	67	56	54	61	246	62	85	80	64	291	77	55	73	42	247	34	33	46	37	150	
Contractor	47	37	29	38	141	57	47	71	82	257	109	82	32	69	292	64	66	92	60	282	
Total	114	93	83	99	389	119	132	151	146	548	186	137	105	111	539	98	99	138	97	432	1908
Reportable Items Forwarded for Evaluation	129	195	213	173	710	294	188	292	187	961	242	290	272	191	995	122	115	138	127	502	3168
Inquiries:																					
TSP	71708	57210	54124	45506	228548	42796	62373	60864	34687	200720	23218	22088	29587	17374	92267	14183	9766	19299	3469	46717	
Other		3192	2406	3384	12689	4158	2747	2172	1348	10425	2013	3351	3460	1920	10744	3477	2818	2181	1526	10002	
Total	75415	60402	56530	48,890	241237	46954	65120	63036	36035	211145	25231	25439	33047	19294	103011	17660	12584	21480	4995	56719	612112
Compliances Certified	280	341	341	254	1253	278	369	335	486	1468	279	308	331	408	1322	358	280	322	315	1275	5318

NEW TECHNOLOGY REPORTING BY FISCAL YEAR (Old System July-June) 1980-1983

Old Fiscal Year	1980					1981					1982					1983					
Calendar Year	(1979)		(1980)			(1980)		(1981)			(1981)		(1982)			(1982)		(1983)			
Quarters	3	4	1	2	Total	3	4	1	2	Total	3	4	1	2	Total	3	4	1	2	Total	Grand Total
MARSHALL																					
Reportable Items Received:																					
In-House	11	14	13	6	44	13	5	22	13	53	9	12	10*	18	49	6	7	5	12	30	
Contractor	93	58	56	61	268	99	48	44	87	278	30	35	70	29	164	39	43	27	36	145	
Total					312					331					213					175	1031
Reportable Items Screened and Rejected																					
In-House	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Contractor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Reportable Items Forwarded for Evaluation	44	39	56	46	185	73	37	47	49	206	36	43	62	44	185	43	48	32	45	168	
Inquiries:																					
TSP	55997	32204	42033	34400	164634	27504	42382	42260	21073	133219	14636	12685	15756	8503	51580	5830	2473	5676	1028	15007	
Other	400	510	250	200	1360	185	225	236	0	646	0	186	1318	847	2351	1194	763	503	463	2923	
Total					165994					133865					53931					17930	371720
Compliances Certified	33	38	46	46	163	54	41	52	60	207	42	52	42	64	200	58	60	24	49	191	
LEWIS																					
Reportable Items Received:																					
In-House	23	17	25	14	79	13	9	21	15	58	11	17	12	9	49	19	10	10	17	56	
Contractor	22	36	12	20	90	13	19	22	23	77	14	25	26	34	99	13	20	18	34	85	
Total					169					135					148					141	593
Reportable Items Screened and Rejected:																					
In-house	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Contractor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Reportable Items Forwarded for Evaluation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Inquiries:																					
TSP	360	1050	1439	155	3004	175	2653	1465	292	4585	128	63	1307	383	1881	183	222	130	24	559	
Other	292	229	390	316	1227	272	278	436	300	1286	226	404	235	125	990	117	83	60	18	278	
Total					4231					5871					2871					837	13810
Compliances Certified	45	45	0	33	123	34	75	44	44	197	53	44	83	62	242	57	50	60	35	202	

Old Fiscal Year	1980					1981					1982					1983					
Calendar Year	(1979)		(1980)			(1980)		(1981)			(1981)		(1982)			(1982)		(1983)			
Quarters	3	4	1	2	Total	3	4	1	2	Total	3	4	1	2	Total	3	4	1	2	Total	Grand Total
GODDARD																					
Reportable Items Recd.:																					
In-House	8	6	15	5	34	12	15	18	5	50	12	12	7	12	43	5	6	8	12	31	
Contractor	11	17	9	16	53	19	6	11	16	52	11	3	7	13	34	4	6	13	2	25	
Total					87					102					77					56	322
Reportable Items Screened and Rejected:																					
In-House	3	2	1	9	15	0	1	9	9	19	3	4	2	2	11	2	0	2	1	5	
Contractor	3	14	5	9	31	0	13	7	9	29	5	2	4	3	14	5	3	3	4	15	
Reportable Items Forwarded for Evaluation	1	1	5	7	14	12	14	21	7	54	7	11	5	9	32	5	4	3	4	16	
Inquiries:																					
TSP	699	727	404	778	2608	731	1890	953	778	4352	832	785	2091	1184	4892	537	600	333	105	1575	
Other	20	29	6	7	62	7	9	7	7	30	5	5	0	0	10	0	0	0	0	0	
Total					2670					4380					4902					1575	13529
Compliances Certified	74	75	124	21	294	59	69	45	21	194	25	80	82	93	280	72	85	61	81	299	
AMES																					
Reportable Items Received:																					
In-House	11	5	2	7	25	6	7	9	6	28	15	15	26	25	81	28	35	16	12	91	
Contractor	9	6	3	6	24	0	1	11	9	21	3	6	8	7	24	9	12	11	7	39	
Total					49					49					105					130	333
Reportable Items Screened and Rejected:																					
In-House	4	2	2	3	11	1	1	0	0	2	10	2	0	0	12	0	0	5	0	5	
Contractor	6	4	2	3	15	0	3	0	0	3	0	0	0	0	0	0	0	3	5	8	
Reportable Items Forwarded for Evaluation	10	3	3	6	22	1	7	0	0	8	0	37	12	4	53	12	7	27	13	59	
Inquiries:																					
TSP	1139	681	785	1103	3708	1950	333	638	346	3267	83	1514	450	1064	3111	846	708	538	661	2753	
Other	1789	696	805	1295	4585	2708	397	751	485	4341	277	993	381	364	2015	412	394	376	321	1503	
Total					8293					7608					5126					4256	25283
Compliances Certified	**	29	18	43	?	33	71	45	29	178	55	46	36	38	175	48	20	27	14	109	

*Marshall 1982 Quarter 1 "draft"

**Ames 1979 Quarter 3 = difference between 2nd and 4th quarters

Old Fiscal Year	1980					1981					1982					1983					
Calendar Year	(1979)		(1980)			(1980)		(1981)			(1981)		(1982)			(1982)		(1983)			Grand
Quarters	3	4	1	2	Total	3	4	1	2	Total	3	4	1	2	Total	3	4	1	2	Total	Total
JOHNSON																					
Reportable Items Received:																					
In-House	5	3	5	8	21	3	0	5	14	22	5	1	3	4	13	5	1	5	3	14	
Contractor	67	78	59	83	287	79	59	116	70	324	74	58	65	54	251	29	61	76	51	217	
Total					308					346					264					231	1140
Reportable Items Screened and Rejected:																					
In-House	0	0	0	2	2	1	0	2	2	5	2	0	1	0	3	0	1	0	0	1	
Contractor	11	15	10	16	52	5	6	18	34	63	26	16	10	9	61	14	23	28	10	75	
Reportable Items Forwarded for Evaluation	45	51	61	64	221	57	3	104	47	211	53	28	68	37	186	34	38	37	39	148	
Inquiries:																					
TSP	1221	3487	1483	185	6376	4959	3930	3624	2409	14922	2136	2110	1311	674	6231	488	2688	3550	913	7639	
Other	94	92	91	88	365	97	97	87	86	367	76	90	106	72	344	126	85	77	89	377	
Total					6741					15289					6575					8016	36621
Compliances Certified	26	27	28	19	100	26	26	24	25	101	20	28	30	32	110	25	30	34	25	114	
JPL																					
Reportable Items Received:																					
In-House	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Contractor	95	88	92	103	378	83	95	82	85	345	103	60	74	62	299	52	63	72	61	248	
Total					378					345					299					248	1270
Reportable Items Screened and Rejected:																					
In-House	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Contractor	0	0	1	4	5	33	6	20	29	88	71	57	14	50	192	17	27	39	34	117	
Reportable Items Forwared for Evaluation	0	78	61	8	147	123	95	94	48	360	103	147	76	62	388	0	0	0	0	0	
Inquiries:																					
TSP	5630	14583	6115	7089	33417	4273	6343	8945	7857	27418	4763	2317	6938	4603	18621	4129	1872	7540	229	13770	
Other	348	921	452	389	2110	147	1159	129	194	1629	543	885	1073	163	2664	36	199	96	5	336	
Total					35527					29047					21285					14106	99965
Compliances Certified	42	36	38	43	159	26	48	58	51	183	44	28	16	60	148	43	28	32	57	160	

TABLE 7.
NTR REPORTING IN CALENDAR YEAR 1984
TOTALS OF ALL FIELD CENTERS

Quarter	1	2	3	4	TOTAL
Reportable Items Received:					
In-House	106	101	73	63	343
Contractor	165	155	153	183	656
Total	271	256	226	246	999
Reportable Items Screened and Rejected:					
In-House	56	44	33	29	162
Contractor	47	36	29	58	170
Total	103	80	62	87	332
Reportable Items Forwarded for Evaluation	154	111	93	134	492
Inquiries:					
TSP	3,800	12,826	24,890	22,237	63,753
Other	1,860	1,442	1,933	1,454	6,689
Total	5,660	14,268	26,823	23,691	70,442
Compliances Certified	549	308	339	290	1486

NEW TECHNOLOGY REPORTED FOR CALENDAR YEAR 1984
TOTAL OF ALL FIELD CENTERS

Calendar Year Quarter	1984 1	2	3	4	TOTAL
Ames					
Reportable Items Received:					
In-House	9	3	2	3	17
Contractor	3	2	1	2	8
Total	12	5	3	5	25
Reportable Items Screened and Rejected:					
In-House	0	1	0	4	5
Contractor	1	2	1	3	7
Total	1	3	1	7	12
Reportable Items Forwarded for Evaluation	12	3	10	22	47
Inquiries:					
TSP	256	266	866	517	1905
Other	211	272	212	169	864
Total	467	538	1078	686	2769
Compliances Certified	23	19	16	17	75
Goddard					
Reportable Items Received:					
In-House	1	4	7	7	19
Contractor	4	3	8	7	22
Total	5	7	15	14	41
Reportable Items Screened and Rejected:					
In-House	4	1	2	4	11
Contractor	0	3	1	0	4
Total	4	4	3	4	15
Reportable Items Forwarded for Evaluation	6	0	3	1	10
Inquiries:					
TSP	124	597	1148	1071	2940
Other	0	0	0	0	0
Total	124	597	1148	1071	2940
Compliances Certified	79	86	85	56	306

Calendar Year			1984		
Quarter	1	2	3	4	TOTAL
Johnson					
Reportable Items Received:					
In-House	2	1	5	7	15
Contractor	30	40	28	38	136
Total	32	41	33	45	151
Reportable Items Screened and Rejected:					
In-House	0	0	0	1	1
Contractor	8	8	2	0	18
Total	8	8	2	1	19
Reportable Items Forwarded for Evaluation	39	35	28	28	130
Inquiries:					
TSP	424	2259	639	523	3845
Other	76	101	108	382	667
Total	500	2360	747	905	4512
Compliances Certified	36	24	13	18	91
Kennedy					
Reportable Items Received:					
In-House	7	0	2	4	13
Contractor	5	2	0	0	7
Total	12	2	2	4	20
Reportable Items Screened and Rejected:					
In-House	1	1	0	0	2
Contractor	3	2	0	0	5
Total	4	3	0	0	7
Reportable Items Forwarded for Evaluation	11	2	5	9	27
Inquiries:					
TSP	103	765	745	912	2525
Other	25	22	17	20	84
Total	128	787	762	932	2609
Compliances Certified	6	6	7	6	25

Calendar Year			1984		
Quarter	1	2	3	4	TOTAL
Langley					
Reportable Items Received:					
In-House	67	59	48	31	205
Contractor	8	11	26	20	65
Total	75	70	74	51	270
Reportable Items Screened and Rejected:					
In-House	51	41	31	20	143
Contractor	14	3	3	36	56
Total	65	44	34	56	199
Reportable Items Forwarded for Evaluation	31	25	30	15	101
Inquiries:					
TSP	388	530	116	21	1055
Other	1116	351	1187	798	3452
Total	1504	881	1303	819	4507
Compliances Certified	178	35	80	-18*	275
Lewis					
Reportable Items Received:					
In-House	8	21	7	5	41
Contractor	17	10	14	8	49
Total	25	31	21	13	90
Reportable Items Screened and Rejected:					
In-House	0	0	0	0	0
Contractor	0	0	0	0	0
Total	0	0	0	0	0
Reportable Items Forwarded for Evaluation	0	0	0	0	0
Inquiries:					
TSP	49	9	0	0	58
Other	55	17	18	18	108
Total	104	26	18	18	166
Compliances Certified	31	72	39	64	206

*To correct error in 3rd quarter

Calendar Year			1984		
Quarter	1	2	3	4	TOTAL
Marshall					
Reportable Items Received:					
In-House	12	13	2	6	33
Contractor	45	35	15	53	148
Total	57	48	17	59	181
Reportable Items Screened and Rejected:					
In-House	0	0	0	0	0
Contractor	0	0	0	0	0
Total	0	0	0	0	0
Reportable Items Forwarded for Evaluation	55	46	17	59	177
Inquiries:					
TSP	726	2043	1638	6665	11072
Other	268	568	0	0	836
Total	994	2611	1638	6665	11908
Compliances Certified	168	27	13	28	236
Jet Propulsion Laboratory					
Reportable Items Received:					
In-House	0	0	0	0	0
Contractor	53	52	61	55	221
Total	53	52	61	55	221
Reportable Items Screened and Rejected:					
In-House	0	0	0	0	0
Contractor	21	18	22	19	80
Total	21	18	22	19	80
Reportable Items Forwarded for Evaluation	0	0	0	0	
Inquiries:					
TSP	1730	6357	19738	12528	40353
Other	109	111	391	67	678
Total	1839	6468	20129	12595	41031
Compliances Certified	28	39	86	119	272

TABLE 8.
SOURCES REPRESENTED IN NASA NEW TECHNOLOGY EVALUATION PROGRAM
November 10, 1980-November 30, 1982

	Total Sources (contractors and NASA)		NTR Evaluated by SRI	
	#	%	#	%
Large companies and institutes	60	32	1,168	53
Small businesses	80	42	198	9
Universities	39	21	66	3
NASA facilities	10	5	772	35
TOTALS	189	100	2,204	100

From: NASA New Technology Identification and Evaluation 1982 Final Report (draft), January 1983.

TABLE 9.
TOP TEN CONTRACTOR SOURCES OF
NASA NEW TECHNOLOGY
(Evaluated by SRI, November 10, 1980-November 30, 1982)

1. Rockwell (394)
2. McDonnell Douglas (44)
3. Hughes (41)
4. Martin Marietta (39)
5. Lockheed (38)
6. Boeing (33)
7. RCA (32)
8. General Dyanmics (27)
9. Honeywell (26)
10. TRW (26)

From: NASA New Technology Identification and Evaluation 1982 Final Report (draft), January 1983, Appendix C.

TABLE 10.
RATIOS OF TSP INQUIRIES
TO NEW TECHNOLOGY ITEMS REPORTED

Date	Ratio
1964	4.7:1
1965	5.6:1
1966	2.4:1
1967	2.4:1
1968	2.8:1
1969	2.4:1
1970	4.7:1
1971	17.8:1
1972	22.8:1
1973	21.3:1
1974	22.3:1
1975	18.0:1
1976	29.4:1
1977	65.5:1
1978	35.6:1
1979	106.3:1
1980	130.2:1
1981	93.2:1
1982	55.4:1
1983	44.5:1
1984	66.5:1

TABLE 11.
RATIOS OF TU INQUIRIES
TO NEW TECHNOLOGY ITEMS REPORTED

Date	Ratio
1964	4.7:1
1965	5.6:1
1966	2.4:1
1967	3.5:1
1968	5.0:1
1969	4.7:1
1970	8.1:1
1971	24.8:1
1972	29.2:1
1973	28.1:1
1974	52.5:1
1975	28.6:1
1976	50.9:1
1977	84.0:1
1978	51.5:1
1979	127.9:1
1980	147.3:1
1981	117.4:1
1982	85.1:1
1983	75.3:1
1984	90.7:1

TABLE 12.
REPORTABLE ITEMS RECEIVED (YEARLY TOTALS)

	FY 1980	FY 1981	FY 1982	FY 1983	CY 1984
Ames Research Center					
In-House	25	28	81	91	17
Contractor	24	21	24	39	8
Langley Research Center					
In-House	273	333	277	192	205
Contractor	41	85	47	67	65
Lewis Research Center					
In-House	79	58	49	56	41
Contractor	90	77	99	85	49
Goddard Space Flight Center					
In-House	34	50	43	31	19
Contractor	53	52	34	25	22
Jet Propulsion Laboratory*					
In-House	0	0	0	0	0
Contractor	378	345	299	248	221
Marshall Space Flight Center					
In-House	44	53	49	30	33
Contractor	268	278	164	145	148
Johnson Space Center					
In-House	21	22	13	14	15
Contractor	287	324	251	217	136
Kennedy Space Center					
In-House	6	3	16	8	13
Contractor	21	26	38	18	7
Total					
In-House	482	547	528	422	343
Contractor	1162	1208	956	844	656

*JPL submits its items as a contractor institution.

TABLE 13.
REPORTABLE ITEMS SCREENED AND REJECTED
(YEARLY TOTALS)

	FY 1980	FY 1981	FY 1982	FY 1983	CY 1984
Ames Research Center					
In-House	11	2	12	5	5
Contractor	15	3	0	8	7
Langley Research Center					
In-House	207	264	218	134	143
Contractor	23	56	13	50	56
Lewis Research Center					
In-House	0	0	0	0	0
Contractor	0	0	0	0	0
Goddard Space Flight Center					
In-House	15	19	11	5	11
Contractor	31	29	14	15	4
Jet Propulsion Laboratory*					
In-House	0	0	0	0	0
Contractor	5	88	192	117	80
Marshall Space Flight Center					
In-House	0	0	0	0	0
Contractor	0	0	0	0	0
Johnson Space Center					
In-House	2	5	3	1	1
Contractor	52	63	61	75	18
Kennedy Space Center					
In-House	3	1	3	5	2
Contractor	25	8	12	17	5
Total					
In-House	248	291	247	150	162
Contractor	141	257	292	282	170

*Jpl submits its items as a contractor institution.

APPENDIX D

ILLUSTRATIVE MATERIAL

--NASA Form 666A
--Letters to Contractors and Notice to COTR
--Oral Review
--MSFC Telephone Inquiry Sheet
--Idea for New Technology Reporting Plans
--JPL Monthly Report

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION **NEW TECHNOLOGY REPORT**	NT CONTROL NO. *(Official use only)*

INSTRUCTIONS

This report form may be used when reporting inventions, discoveries, improvements or innovations to NASA. Use of this report form is optional; provided, however, that whatever report format is used contain the essential information requested herein.

Please provide information requested in each section as follows:

Section I - A description of the problem that motivated the technology development.

Section II - A technically complete and easily understandable description of the new technology that was developed to solve the problem or meet the objective.

Section III - The unique or novel features of the technology and the results (or benefits) of its application.

Section IV - The inclusion or listing of any pertinent additional documentation or references which aid in the understanding or application of the new technology.

In completing each section, use whatever detail deemed appropriate for a "full and complete disclosure," as required by the New Technology or Property Rights in Inventions Clause. For further guidance as to what constitutes a satisfactory report, please refer to NHB 2170.3, Documentation Guidelines for New Technology Reporting.

Available additional documentation which provides a full, detailed description should be attached, as well as any additional explanatory sheets where necessary.

1. TITLE	
2. INNOVATOR (S) *(Name and Social Security No.)*	
3. EMPLOYER *(Organization and division)*	4. ADDRESS *(Place of performance)*
5. NASA PRIME CONTRACT NO.	6. CONTRACTOR DISCLOSURE NO.

SECTION I - DESCRIPTION OF THE PROBLEM THAT MOTIVATED THE TECHNOLOGY DEVELOPMENT *(Enter A.-General Description of Problem Objective; B.-Key or Unique Problem Characteristics; C.-Past History/Prior Techniques; D.-Limitations of Prior Techniques)*

SECTION II - TECHNICALLY COMPLETE AND EASILY UNDERSTANDABLE DESCRIPTION OF NEW TECHNOLOGY THAT WAS DEVELOPED TO SOLVE THE PROBLEM OR MEET THE OBJECTIVE *(Enter as appropriate A.-Specific description of item; B.-State of development; C.-Operation as a unit; D.-Functional operation; E.-Supportive theory; F.-Engineering specifications; G.-Peripheral equipment; H.-Drawings, graphs, etc.; I.-Parts or ingredients lists; and J.-Maintenance, reliability, safety factors)*

SECTION III - UNIQUE OR NOVEL FEATURES OF THE TECHNOLOGY AND THE RESULTS (OR BENEFITS) OF ITS APPLICATION *(Enter as appropriate A.-Novel or unique features; B.-Development or conceptual problems; C.-Operating characteristics, test data; D.-Analysis of capabilities; E.-Source of error; and F.-Advantages/shortcomings)*

SECTION IV - ADDITIONAL DOCUMENTATION *(Include or list below any pertinent documentation which aids in the understanding or application of the new technology. IF NOT TOO BULKY OR DIFFICULT TO REPRODUCE, INCLUDE COPIES WITH THIS REPORT. For those references or additional documentation available but NOT included in this report (due to their being nonessential to a basic understanding of the new technology and which may be costly to reproduce or handle) complete item A. below)*

A. AVAILABLE DOCUMENTS *(Check and complete)*	☐	1. PAPERS, ARTICLES	☐	4. ASSEMBLY/MFG. DRAWINGS	☐	7. TEST DATA
	☐	2. CONTRACTOR REPORTS	☐	5. PARTS OR INGRED. LIST	☐	8. ASSEMBLY/MFG. PROCED.
	☐	3. ENGINEERING SPECS.	☐	6. OPERATING MANUALS	☐	9. COMPUTER TAPES/CARDS
	10. OTHER *(Specify)*					

B. INDICATE THE DATES OR THE APPROXIMATE TIME PERIOD DURING WHICH THIS TECHNOLOGY WAS DEVELOPED *(i.e., conceived, constructed, tested, etc.)*

C. LIST THE FIRST PUBLICATION OR PUBLIC DISCLOSURE OF THE NEW TECHNOLOGY, AND DATES

D. LIST THE DATES AND ANY PARTICULARLY PERTINENT PAGE NUMBERS OF OTHER PUBLICATIONS WHICH ARE AVAILABLE BUT NOT ATTACHED

E. DEGREE OF TECHNOLOGICAL SIGNIFICANCE *(Check in your best judgment the statement which best expresses the degree of technological significance of this technology)*

☐ 1. MODIFICATION TO EXISTING TECHNOLOGY ☐ 2. SUBSTANTIAL ADVANCE IN THE ART ☐ 3. MAJOR BREAKTHROUGH

COMMENTS

SIGNATURE OF INNOVATOR(S)	DATE

GPO 874-181

139A

date NOT FOUND

TO:

name NOT FOUND

FROM: 139A/Technology Utilization and Applications Officer

SUBJECT:

title NOT FOUND

The Technology Utilization Officer and the Patent Counsel have been jointly designated by the Contracting Officer to administer the New Technology Clause in the subject contract.

The New Technology Clause requires the contractor to search for and document all reportable items made in the performance of the contract. A "Reportable Item" is defined as any invention, discovery, improvement, or innovation, whether or not patentable, that is conceived or first reduced to practice during the contract or upon an understanding in writing that this contract would be awarded.

As part of the review activities of the Technology Utilization and Applications Office, you, as the Contracting Officer's Technical Representative, will be requested annually and upon completion of the contract to list any items you have identified which the contractor should have reported. The Technology Utilization Office will request the contractor to report the items you identify or to show cause for not reporting.

Your consideration in this matter is appreciated.

John Samos

139A

date NOT FOUND

name NOT FOUND

Subject:

title NOT FOUND

This is a reminder that the report required by the contract clause, New Technology, is due. The clause requires a written description of each reportable item or certification that there are none. Reportable items are defined as any invention, discovery, improvement, or innovation, whether or not patentable, that is first reduced to practice during the contract.

A suggested format is enclosed to aid you in preparing your report. The use of this particular format is not mandatory; however, your report must include all the information specified by the New Technology clause.

A New Technology report is required even though no reportable items were developed and is a required delivery item.

John Samos
Technology Utilization and
Applications Officer

Enclosure
NT format

139A

date NOT FOUND

name NOT FOUND

Subject:

title NOT FOUND

It appears that the following may constitute reportable items as defined by the New Technology Clause of the contract:

sub NOT FOUND

Please review this technology in light of the requirements of the New Technology clause and report it, or if you determine that it should not be reported, give your reasons in your New Technology report.

John Samos
Technology Utilization and
Applications Officer

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama
35812

NASA

Reply to Attn of AT01

Subject: New Technology Reporting Requirements of Contract

This letter is to call to your attention the requirements for reporting new technology as specified in the above contract. The New Technology Clause contains a withholding provision for noncompliance with the clause.

For your guidance, a reportable item is any discovery, advancement, improvement, or innovation, whether major or minor in nature, and whether or not patentable. Such items could be new technical concepts or theories; new computer programs; new applications of older technology; improved methods, systems, or processes; new devices, configurations, apparatus, instruments, or tools; new materials or combinations of materials; or new fastening, bonding, fabricating, or manufacturing techniques of any kind.

Reportable items are credited to the individual originators and may be selected for NASA publication, in which case the innovators will receive cash awards. Attached are samples of NASA Tech Briefs describing innovations in nine major categories of technology.

Please send a synopsis of your plans for motivating your employees to identify and report new technology to Mr. Ismail Akbay, Director, Technology Utilization Office, Code AT01, Marshall Space Flight Center, AL 35812. The plan should provide the name of a technical contact, and communications relative to reportable items should be forwarded to Mr. Akbay.

Ismail Akbay
New Technology Representative

Enclosures

18-52.227-70 NEW TECHNOLOGY (APRIL 1984)

SUMMARY OF REPORTING REQUIREMENTS

THE CONTRACTOR SHALL PROVIDE THE FOLLOWING:

PARAGRAPH	
(e)(1)	A DESCRIPTION OF HIS NEW TECHNOLOGY PROCEDURES ON HOW HE WILL ESTABLISH AND MAINTAIN A NEW TECHNOLOGY IDENTIFICATION AND REPORTING SYSTEM.
(e)(2)	A COMPLETE TECHNICAL REPORT FOR EACH REPORTABLE ITEM (NASA FORM 666A OR EQUIVALENT).
(e)(3)(i)	INTERIM REPORTS, AT LEAST EVERY 12 MONTHS FROM THE DATE OF THE CONTRACT.
(e)(3)(ii)	A FINAL REPORT WITHIN 3 MONTHS AFTER THE COMPLETION OF THE CONTRACT WORK.
(h)(4)	A COPY OF ALL SUBCONTRACTS FOR EXPERIMENTAL, RESEARCH, DESIGN, OR ENGINEERING WORK.

INVENTIONS REPORTABLE UNDER THE NEW TECHNOLOGY CLAUSE

With respect to inventions reported for which the Government acquires title, and the rights thereto have not been waived to the Contractor, the Patent Representative of the Government Contracting Officer will consider the invention for possible patenting in the United States and foreign countries. Should NASA file a patent application on the invention, each inventor will under current procedures obtain a minimum recognition award of $100 from NASA's Inventions and Contributions Board.

It is the policy of NASA as set forth in the New Technology clause to normally grant the Contractor a revocable, nonexclusive, royalty-free license in each patent application filed by NASA on the invention.

The procedures required of the Contractor by the New Technology clause to ensure the reporting of Reportable Items also requires the maintenance of records that are necessary to document the conception and/or first actual reduction to practice of reportable items because of the important legal significance of these events in determining the ownership and patent entitlement under the laws of the United States.

The Patent Representative is able to provide further information upon request about the procedures by which the Contractor may ask NASA for waiver of rights to inventions reported.

PRIVACY ACT STATEMENT FOR NASA FORMS 666 AND 666A

1. Inclusion of the social security number (SSAN) on NASA Forms 666 and 666A is authorized by Executive Order 9397, dated November 22, 1943.

2. It is used as an identifier in the event you are granted an award by the NASA Inventions and Contributions Board and its use is made necessary because of the number of present and former Federal and contractor employees who have identical names and birth dates.

3. The disclosure is mandatory only if an award is to be made.

4. The home address of the new technology innovator should also be included in block 2. INNOVATOR of the NASA FORM 666A.

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama
35812

NASA

Reply to Attn of AT01

Subject: New Technology Reporting Requirements of Contract

This letter is to call to your attention the requirements for reporting new technology as specified in the above contract. Approximately one month ago, a letter was sent to you that transmitted certain information that may be helpful in implementing the requirements of the New Technology Clause in your contract. This letter also requested certain information that will assist me in administering the clause as the appointed New Technology Manager. To date, I have not received this information. For your convenience, the pertinent paragraphs of your contract are repeated on the attached page.

Please send a copy of your procedures for motivating your employees to identify and report new technology to the Technology Utilization Office, Code AT01, Marshall Space Flight Center, AL 35812. It would also be beneficial if your procedures identified a technical contact (New Technology Representative) for subsequent communications relative to your procedures and any reportable items.

John R. Richardson
New Technology Manager
Technology Utilization Office

Enclosure

AT-9(OT)-5-81

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama
35812

NASA

Reply to Attn of AT01

Subject: Request for Interim New Technology Report

In accordance with the New Technology Clause of your contract you are required to submit an interim report at least every 12 months from the date of the contract. Your interim report shall certify that the specified procedures for identifying and reporting Reportable Items have been followed throughout the reporting period, and shall certify that Reportable Items have been reported. Your interim report is past due.

John R. Richardson
New Technology Representative
Technology Utilization Office

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama
35812

NASA

Reply to Attn of AT01

Subject: Request for Interim Patent Rights Report -

In accordance with the Patent Rights Clause of your contract, you are required to submit an interim report at least every 12 months from the date of the contract. Your interim report is past due; please submit it promptly.

John R. Richardson
New Technology Manager
Technology Utilization Office

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama
35812

NASA

Reply to Attn of AT01

Subject: Request for Interim Patent Rights Report -

In accordance with the Patent Rights Clause of your grant, you are required to submit an interim report at least every 12 months from the date of the grant. Your interim report is past due; please submit it promptly.

John R. Richardson
New Technology Manager
Technology Utilization Office

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama
35812

NASA

Reply to Attn of AT01

Subject: Request for Final New Technology Report -

In accordance with the New Technology Clause of your contract, you are required to submit a final report within 3 months after completion of the contract work listing all Reportable Items or certifying that there were no such Reportable Items. (Please note that "Reportable Item" covers more than "invention" and includes discoveries, improvements, or innovations, whether or not patentable, and computer programs.) Also, if there were no subcontracts containing the New Technology Clause, your final report shall so certify.

Your final report is past due; please submit it promptly, in triplicate, to the Technology Utilization Office, Code AT01, George C. Marshall Space Flight Center, Marshall Space Flight Center, AL 35812.

John R. Richardson
New Technology Representative
Technology Utilization Office

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama
35812

NASA

Reply to Attn of AT01

TO:

FROM: AT01/Technology Utilization Office

SUBJECT: New Technology Reporting of Contract/Grant _____
with _____

Attached is the final New Technology report on the subject contract/grant. In order to insure that all new technology has been reported as required, we request that you submit to us your opinion as to whether all items reported as new technology have been submitted.

New technology disclosures can be new computer programs, new theories or concepts, new uses for older technology or equipment, improved methods for accomplishing any task, new systems or processes, new designs, tools, instruments, new materials or combinations of materials, new data concerning materials properties, or new building, fastening, bonding, fabricating, and manufacturing techniques of any kind. Most of the items reported are not patentable but are nevertheless very valuable to the public sector.

A form is attached which you may use to advise us of your determinations in this matter. Please return this form within 3 working days. Any questions may be directed to the Technology Utilization Office at 453-2223.

_____
Technology Utilization Office

Enclosures

25th Anniversary
1958-1983

AT-1(OT)-1-84

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama
35812

NASA

Reply to Attn of

TO: AT01/Technology Utilization Office

FROM:

SUBJECT: New Technology Reporting of Contract/Grant _____
with _____

After reviewing the subject contract and final new technology report, I have concluded the following:

☐ I agree with the contractor's final new technology report in that:

- ☐ No new technology was developed in the performance of the subject contract.
- ☐ The new technology reported is correct and all inclusive to the best of my knowledge.

☐ I disagree with the contractor's final new technology report in that:

- ☐ The below listed items should have been reported as new technology.
- ☐ The below listed additional items should have been reported as new technology

☐ The contract has been, or is in the process of being, extended.

_____

_____

_____

_____

_____

_____

(Attach extra sheets if necessary.)

_____ _____
Contract COR's Signature Date

CONTRACT
WORD PROCESSING MANUAL
NOTE TO USERS

CHANGE No. 21 DATE: FEBRUARY 24, 1984

THE ATTACHED REVISED PAGE(S) TO THE CONTRACT WORD PROCESSING MANUAL REFLECT THE FOLLOWING:

1. Addition of payment language for Task Assignment contract.

2. Addition of contract schedule language to delete the requirement for use of SI units from the P-72 when this requirement has been waived.

3. Addition of requirement for contractor to include in his oral review a brief summary of new technology that is reportable under the New Technology clause.

   Note: Item 3 is included at the request of John Samos in an effort to increase new technology reporting. A representative from the TU&AO will attend the oral review when held at LaRC and an effort will be made to attend an oral review held elsewhere.

4. Other minor administrative and editorial changes.

ANY QUESTIONS REGARDING THE ABOVE SHOULD BE ADDRESSED TO:
PHYLLIS BURRAGE, AOB, EXTENSION 3629

AFFECTED CODE(S)	AFFECTED PAGE(S)
B-12A, B-12B, B-12C, B-14A	25, 26, 27, 29, 29A, 30,
B-14B, B-14C, B-23AA, B-30,	87B, 190
C-52, C-53, G-29A	

■B-27

■. Quarterly Financial Management Report--The Contractor shall submit a financial report detailed by categories specified in paragraph ■. above on NASA Form 533Q at times and in accordance with the instructions contained on the reverse side of the form.

■B-28

*■. Cost Accrual Plan--Within thirty (30) days from the date of contract, the Contractor shall furnish a Cost Accrual Plan. This paln shall be submitted on a NASA Form 533Q and consist of a one (1) line entry, total value, for each time period specified on the form. The plan shall be updated as requested by the Government.

■B-29

**■. Cost Accrual Plan--Within thirty (30) days from the date of contract, the Contractor shall furnish a Cost Accrual Plan. This plan shall be submitted on a NASA Form 533Q and consist of a one (1) line entry, cost plus fee, for each time period specified on the form. This submission shall be repeated at each three-month interval during the contract period of performance until the period of performance remaining is less than three (3) months. Further, if there is a change in the cost base line during a period for which a plan has been submitted, the Contractor shall submit an updated Form 533Q.

■B-30

■. Oral Review--At approximately the end of the ■ (■) month of contract performance, on a date to be mutually selected by the Contracting Officer and the Contractor, the Contractor shall participate in an informal oral review at the Langley Research Center (or at the Contractor's facility as agreed upon) to present the work accomplished to date under this contract. This review shall include a brief summary of new technology that is reportable under the New Technology Clause of the contract.

*Fixed-Price Contracts over $100K
**Cost-Reimbursement Contracts over $100K if a regular 533Q is not required.

MSFC TECHNICAL INFORMATION QUERY SHEET

RECEIVED BY:	DATE:

REQUESTER:

PHONE NO.:

COMPANY:

ADDRESS:

CITY:

STATE:

ZIP CODE:

SUBJECT/TITLE:

MFS -

AUTHOR/INNOVATOR:

ADDITIONAL INFORMATION:

ACTION TO BE COMPLETED BY:

☐ STIF
☐ TU OFFICE
☐ OTHER FIELD CENTER _____

MSFC - Form 3997 (August 1984)

00201

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland
20771

NASA

Reply to Attn of 204

February 9, 1984

TO: NASA Headquarters
Attention: Assistant General Counsel for Patent Matters
Mr. Robert F. Kempf/GP

FROM: Management Operations Directorate
Patent Counsel

SUBJECT: Plan for New Technology Reporting

In response to your request, I have prepared the enclosed proposed revision of the subject provision of NPR 3.501(b)(32) for your consideration. In general, the changes made are reflective of the changes in the current New Technology clause, my review of plans submitted by GSFC contractors and my awareness of contractors' compliance deficiencies with the various obligations of the clause in administering the clause in GSFC contracts. As a consequence, the changes reflect a shift in emphasis from the broad perspective of the present provision to a more specific perspective.

The changes considered by me to be the most significant, and the reasons therefor, are the following. Initially, the threshold level for use of the provision has been raised from $1,000,000 to $5,000,000 in recognition of both inflation and the associated administrative burden. Plans may still be required for contracts of lesser amounts under the provision or under the New Technology clause. A requirement for submission of the Plan prior to contract award for approval has been added for the purpose of strengthening our hand in obtaining acceptable plans.

In paragraph (c) of the Plan, the concept of a requirement for review of the work for identification of new technology has been introduced to encourage efforts additional to that of reliance on inventor/innovator initiated identification. If additional emphasis on such review is desired, descriptive terms, such as positive, active, frequent or periodic may be added. Unlike the current Plan, the requirement for annual and final reports is addressed, hopefully to avoid the present widespread need for reminders to contractors to submit such reports. Finally, the clause's requirement for selection and inclusion of an appropriate clause for inclusion in R&D subcontracts and the submission of a notification of award of each subcontract wherein a clause is included is addressed because of the present extensive failure of contractors to comply with these requirements. These requirements are also not considered in the current Plan.

The attention given to periodic meetings between contractor and NASA personnel in the present plan has been deleted because of my understanding that such meetings are rarely undertaken.

I strongly believe that a meaningful "up front" effort to require contractors to face-up to their new technology reporting obligations can be significantly more effective in ensuring contractors' compliance with such obligations than a "downstream" withholding of payment.

John O. Tresansky

Enclosure

NPR 3.501(c)(32) requests for proposals and requests for quotations for contracts in excess of $5,000,000, where the conduct of research, experimental, design, engineering, or developmental work is contemplated, and in such contracts of lesser dollar value deemed appropriate by the contracting officer and the technology utilization officer of the installation concerned, and for which the "New Technology" clause of 9.107-5 is applicable, shall contain the following requirement:

PLAN FOR NEW TECHNOLOGY REPORTING ( )

Each offeror shall submit, as part of his proposal, estimates of the cost and manpower requirements to perform new technology reporting. A detailed Plan for New Technology Reporting will not be required until the offeror is directed to submit his plan by the Contracting Officer. The offeror will be required to indicate in his original proposal that he understands that a detailed Plan may be required to be submitted for approval prior to execution of a contract if he is selected for negotiations, and that this Plan will describe how he intends to carry out the provisions of the "New Technology" clause of the contract. The Plan shall:

(a) Identify the specific areas of technical effort which are considered likely to generate new technology.

(b) Describe the means by which project supervisory and technical personnel will be indoctrinated on the responsibilities, details and benefits of new technology reporting.

(c) Describe the procedures to be established, maintained and followed for review of the effort to be undertaken for the purposes of identification and reporting (disclosure) of new technology within the time periods and in the manner prescribed by the New Technology clause.

(d) Identify any incentive practices for individuals to report (disclose) new technology developed by them.

(e) Describe the procedure for timely submission of the interim and final new technology reports required by the New Technology clause.

(f) Describe the procedures for selecting which of NASA's New Technology clause or Patent Rights clause is to be included in each subcontract having as a purpose the conduct of experimental, developmental, research, design or engineering work, and for providing prompt notification of either the award of such subcontracts or a subcontractor's refusal to accept the clause.

(g) Identify the individual(s) assigned substantial and specific responsibilities for ensuring compliance with the requirements of the New Technology clause, as well as their qualifications and organizational placement to discharge these responsibilities.

Patents/ Technology Utilization STATUS REPORT for Section _____

by J. T. English,

A synopsis of activities relating to the compliance of JPL technical sections with the New Technology Article in NAS for the reporting period:

_____ to _____

I. Disclosures received from the section:

Innovator	Case No.	Title
1.		
2.		
3.		
4.		
5.		

II. Patent/ Technology Utilization Actions Taken (during the period)

1. _____
2. _____
3. _____
4. _____
5. _____

III. Comments

_____

_____

_____

Notices

Please sign and return this page to establish that the New Technology Monitoring function as required by NAS-7 was performed. _____

New Technology Monitor, Section _____

IV. Possible New Areas of Innovation (please furnish this information)

Account Code	Title	Cognizant Engineer	Likelihood of Innovation
1.			
2.			
3.			

(fold here, staple and place in JPL mail)

V. Other New Technology Items Suggested

Innovator	New Technology Item
1	
2	
3	
4	
5	

VI. COMMENTS/ SUGGESTIONS re: the Patents, Technology Utilization Actions taken during this reporting period.

APPENDIX E

AWARDS

--Table 1. Total Awards By Field Center, 1973-1984
--Table 2. FY 1984 Awards
--ICB Forms
--Document Flow

TABLE 1.
TOTAL SPACE ACT AWARD DISTRIBUTION

FY'84 SPACE ACT AWARDS

Center	Distribution
MSFC	$52,200
NPO/JPL	$46,100
GSFC	$37,000
ARC	$36,650
LaRC	$34,950
JSC	$26,050
LeRC	$13,350
KSC	$3,500
HQ	$250
NSTL	0
TOTALS	$250,050

TABLE 2.
SPACE ACT AWARDS PROGRAM STATUS
INVENTIONS AND CONTRIBUTIONS BOARD

	TOTAL: FY'84		
	NASA EMPLOYEES	CONTRACTOR EMPLOYEES	COMBINED TOTAL
AWARDS FOR SCIENTIFIC AND TECHNICAL CONTRIBTIONS			
Total Number of Awards	137	93	230
Number of Contributors	267	161	428
Number of Awards of $1,000 or More	14	8	22
Total Value ($) of Awards	$86,100	$50,750	$136,850
AWARDS FOR TECH BRIEFS			
Number of Tech Brief Awards	N/A	N/A	646
Number of Contributors	327	805	1132
Total Value ($) of Awards	$32,700	$80,500	$113,200
TOTAL			
Total Value ($) of Awards	$93,550	$163,200	$250,050

October 26, 1984

.ujon

INVENTIONS AND CONTRIBUTIONS BOARD

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

THE NASA MONETARY AWARD PROGRAM FOR SCIENTIFIC AND TECHNICAL CONTRIBUTIONS

The objectives of this program are to provide official recognition of, and to grant equitable monetary awards for, those inventions and other scientific and technical contributions that have helped to achieve NASA's aeronautical and space goals in the past, and to stimulate and encourage the creation and reporting of similar contributions in the future. To accomplish these objectives, the Inventions and Contributions Board is authorized to recommend the granting of monetary awards in amounts up to $100,000 in accordance with the provisions of the National Aeronautics and Space Act of 1958, and to grant monetary awards in amounts up to $5,000 in accordance with the provisions of the Government Employees Incentive Awards Act of 1954. Space Act awards can be made to any person with no restriction as to employer. Awards made under the authority of the Incentive Awards Act can be made to U. S. Government employees only.

GUIDANCE FOR PREPARATION OF A TECHNICAL EVALUATION

In determining the merits of an invention or other scientific or technical contribution, the Board depends primarily on the information that is provided by the technical evaluator in our Award Evaluation Questionnaire. Furthermore, the Board recognizes that NASA technical personnel are the best sources of reliable information concerning contributions made by NASA employees, or by contractor employees whose activities are under their cognizance.

For this contribution, you are the technical evaluator who can best supply the information that the Board requires in order to make a recommendation that is equitable to both the contributor and to NASA. We are therefore asking you to assist the Board by completing, accurately and thoroughly, the questionnaire which follows these explanatory remarks.

For your convenience, we suggest that you familiarize yourself with the contents of the questionnaire by reading it completely before beginning to answer the questions. You will note that we wish you to provide all pertinent facts, specific details, explanations, and opinions on seven important factors that characterize the contribution. These factors are (1) Description, (2) Significance, (3) Stage of Development, (4) Use, (5) Creativity, (6) Recognition, and (7) Tangible Value. In addition to the answers to the questions, the Board will welcome any additional information that you believe will contribute to the completeness of its deliberations and to the recommendation of a just award. If you find it necessary to modify or expand the format of the questionnaire in order to provide such extra information, we strongly recommend that you do so. In those instances where space for a particular answer is insufficient, please record additional information in the margin or on a separate continuation sheet.

We wish to express the sincere appreciation of the Board for the time and effort you will devote to the completion of the Award Evaluation Questionnaire, and to assure you that all the information you provide will receive thorough and respectful attention.

Frederick J. Lees
Chairman

NASA	Inventions and Contributions Board Award Evaluation Questionnaire	CALTECH CASE ☐ YES ☐ NO	NASA CASE NO.	DATE

SECTION 1-TECHNICAL EVALUATOR'S RESPONSE

1. DESCRIPTION.

a. Briefly describe the contribution in your own terms.

b. Identify the NASA program, project or mission in which the contribution has been used or may be expected to be used.

c. Please supply details describing the use of the contribution and be as specific as possible with respect to system, subsystem, components, etc.

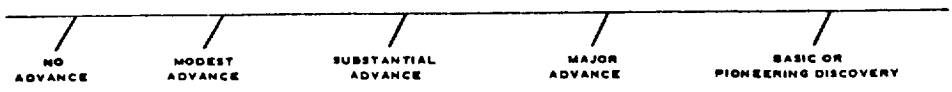
2. SIGNIFICANCE.

a. Explain why you believe that this contribution can be considered to be significant.

b. Describe briefly the significance of this contribution as it relates to a specific NASA mission, if appropriate.

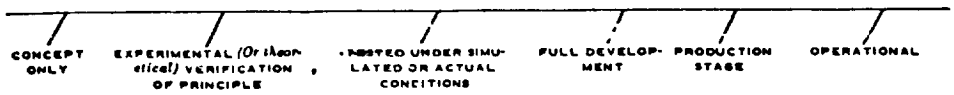
c. If not related to a specific NASA mission, program or project, describe the scientific and technical significance of this contribution as it pertains to other areas of interest.

d. On the bar chart below, indicate your estimate of the general technological or scientific significance of the contribution:



e. On the bar chart below, indicate your estimate of the significance of this contribution in relation to a specific program or project:

3. STAGE OF DEVELOPMENT. On the bar chart below, indicate the stage of development of this contribution.



SECTION I-TECHNICAL EVALUATOR'S RESPONSE (Cont.)

4. ASSESSMENT OF USE.

a. If the contribution is now in operational use, state the extent of such use and describe its performance and general

b. Will the contribution have lasting value? Will its value increase in the future?

c. If the contribution is not now in operational use, please state in what way it is likely to find future use and give your estimate of the extent of such possible use.

d. Explain how and to what extent this contribution may find further application in the following areas:

(1) NASA

(2) Other Government agencies

(3) Commercial

5. CREATIVITY. What is your estimate of the degree of creativity displayed by the contributors in arriving at this contribution *(Consider the expected performance of individuals in similar jobs)?*

6. RECOGNITION. What recognition has this contribution received from the scientific and engineering community, and from NASA management? In your view, what further recognition should this contribution receive?

7. TANGIBLE VALUE. As a measure of tangible value of the contribution, please provide the following information:

a. An estimate of cost savings to date, if applicable* ..... $_____

b. An estimate of future cost savings* ..... $_____

c. Other value; e.g., increased program efficiency, improved management, etc.

* *State the rationale used in the above estimate of cost saving.*

SECTION II-COMMENTS AND CONCURRENCE

1. EVALUATOR

COMMENTS

NAME AND SIGNATURE	TITLE	DATE

NASA INSTALLATION	CONTRACTOR	OTHER

2. EVALUATOR'S SUPERVISOR

COMMENTS

NAME AND SIGNATURE	TITLE	DATE

3. TECHNICAL MANAGEMENT *(NASA installation official)*

COMMENTS

NAME AND SIGNATURE	TITLE	DATE

TO BE COMPLETED BY AWARDS LIAISON OFFICE

4. IDENTIFICATION OF CONTRIBUTORS

NAME	SOCIAL SECURITY NO.	HOME ADDRESS

5. PATENT STATUS		6. EVALUATION
SERIAL/PATENT NO.	DATE FILED	☐ 1ST ☐ 2ND ☐ 3RD

7. BUSINESS ADDRESS IF OTHER THAN NASA EMPLOYEE(S)

8. COMMENTS

NAME AND SIGNATURE	DATE

NASA FORM 1329 DEC 78 PREVIOUS EDITIONS ARE OBSOLETE. PAGE 3

NASA INVENTIONS AND CONTRIBUTIONS BOARD
MONETARY AWARD ANALYSIS
NASA CASE NO. _____

Title _____

Inventor(s) _____

Employer(s) _____

Recommended Amount _____ Recommendation of the Board _____

SIGNIFICANCE

	None	Modest	Average	Substantial	Outstanding	
Aero/Space	0	1	3	6	12	x 40 _____
Scien/Tech	0	1	3	6	12	x 40 _____
Humanitarian	0	1	3	6	12	x 40 _____
						TOTAL _____

DEVELOPMENT

	Concept	Actually Tested	Fully Developed	Operational	
Stage	1	3	4	5	x 20 _____

ASSESSMENT OF USE

	None 0	Low 1-2	Limited 4	Widespread 6	
NASA Present					x 40 _____
" Potential					x 20 _____
Govt Present					x 40 _____
" Potential					x 20 _____
Industry Present					x 40 _____
" Potential					x 20 _____
					TOTAL _____

CREATIVITY

	None	Low	Modest	Average	Above Average	High	
Level	0	1-2	3 - 4	5 - 6	7 - 8	9-10	x 1 _____

AWARD SUMMARY

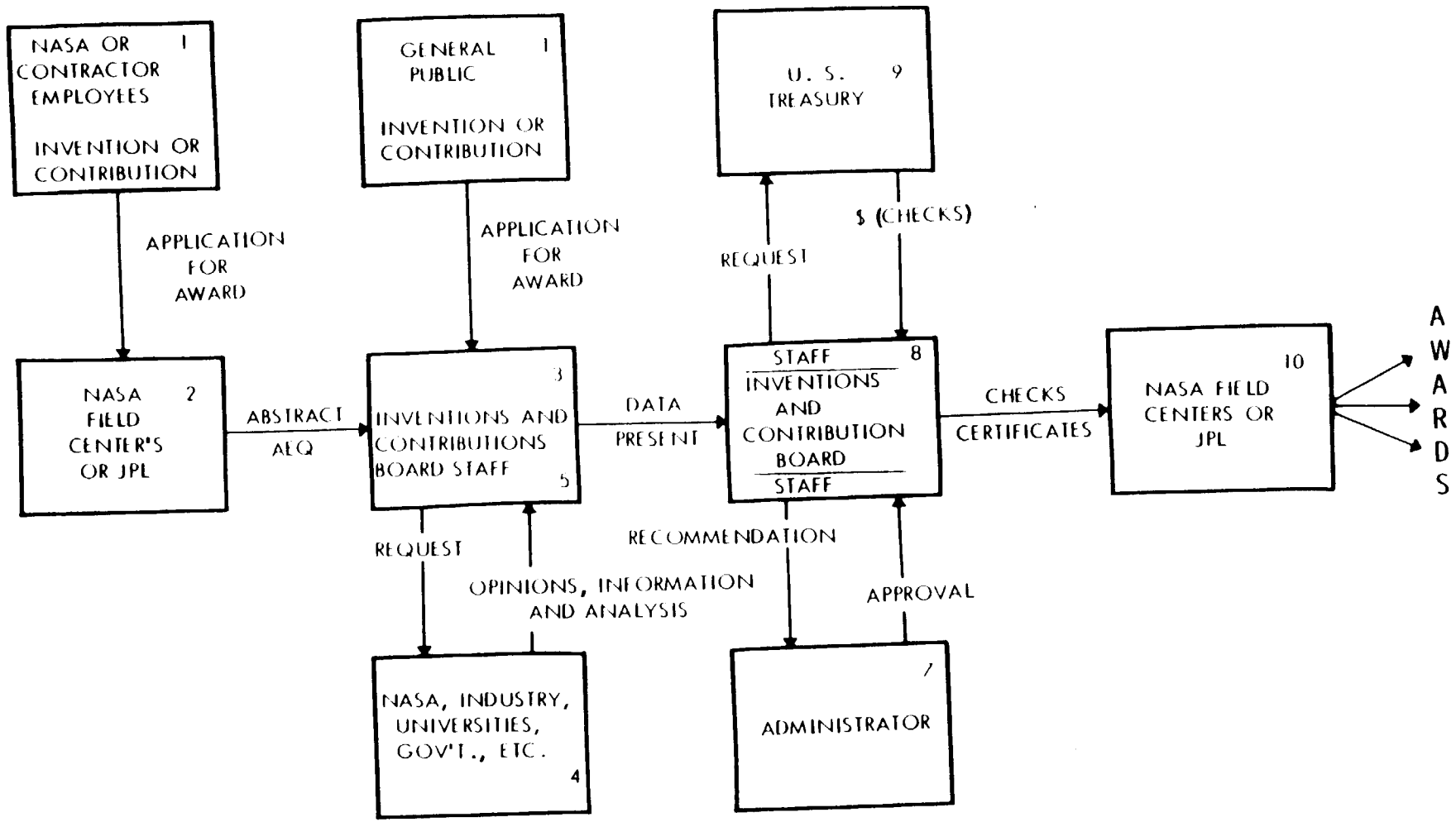
(Signif. ___ + Devel. ___ + Use ___) 1/3 Creativity ___ = Total Points _____

Previous Awards or Royalties _____

EVALUATION SUMMARY

Signed _____

TYPICAL AWARDS PROGRAM DOCUMENTATION FLOW



APPENDIX F

NTR SAMPLE PLAN OF CONTRACTOR

NEW TECHNOLOGY REPORTING PLAN

FOR

(NAME OF PROGRAM)

(NAME OF COMPANY)

(ADDRESS)

TABLE OF CONTENTS

APPENDICES

FIGURES

INTRODUCTION

(company) has been involved in the national space program since its inception. As a major NASA contractor, we are fully committed to the program established by NASA to expedite and implement the transfer of new technology to the non-aerospace business community. To fulfill that commitment, we have instituted procedures to assure prompt disclosure and reporting to NASA of all new technology developed under contract. Our New Technology Program Plan for the (program) uses established procedures that have proved to be effective.

POTENTIAL AREAS OF INNOVATION

The area in which we feel new technology may be found is in the application of existing hardware and software to a new mission. The _____ contract is a spacecraft system contract committed to the maximum utilization of residual hardware and software and heritage design. We will monitor all technical areas to insure that all appropriate items are identified and documented under the New Technology Program.

MANAGEMENT INVOLVEMENT

A (company) policy directive has been issued, entitled, "New Technology Planning and Reporting - NASA Programs," TO-00-D1 (Appendix A), which emphasizes the importance placed on this function by top management. The procedure states:

"It is a policy of _____(company)_____ to provide and maintain a New Technology planning and reporting program to comply with the requirements of the New Technology Clause and to carry out the intent and objectives of current NASA Federal Acquisition Regulations.

"All _____(company)_____ management shall encourage and stimulate employees to greater accomplishments of invention and innovation and, to no lesser degree, the timely disclosure and documentation of the results of their creativity.

"Effective motivational programs, channels of communication and instructions shall be provided to assure timely identification and complete disclosure, collection, review and reporting of New Technology achievements."

This policy has been implemented by a Standard Procedure No. 5.7 (Appendix B) which defines the program and assigns responsibilities within the company.

ORGANIZATION

The _____(company)_____ organization reponsible for identifying, encouraging and reporting new technology items is shown in Figure 1. Extensive aerospace engineering and management experience is represented by this organization.

_____(name)_____ , has overall responsibility for administering the New Technology Clause on all NASA contracts at _____(company)_____.

(Background)

(name) briefs each Program New Technology Representative as well as other appropriate personnel at the inception of each NASA contract so that all are aware of their responsibilities under the New Technology Clause. Periodic follow-up activities with each Program New Technology Representative are also conducted by (name) during the course of each contract, including searching for reportable items and giving guidance and assistance in their prompt disclosure.

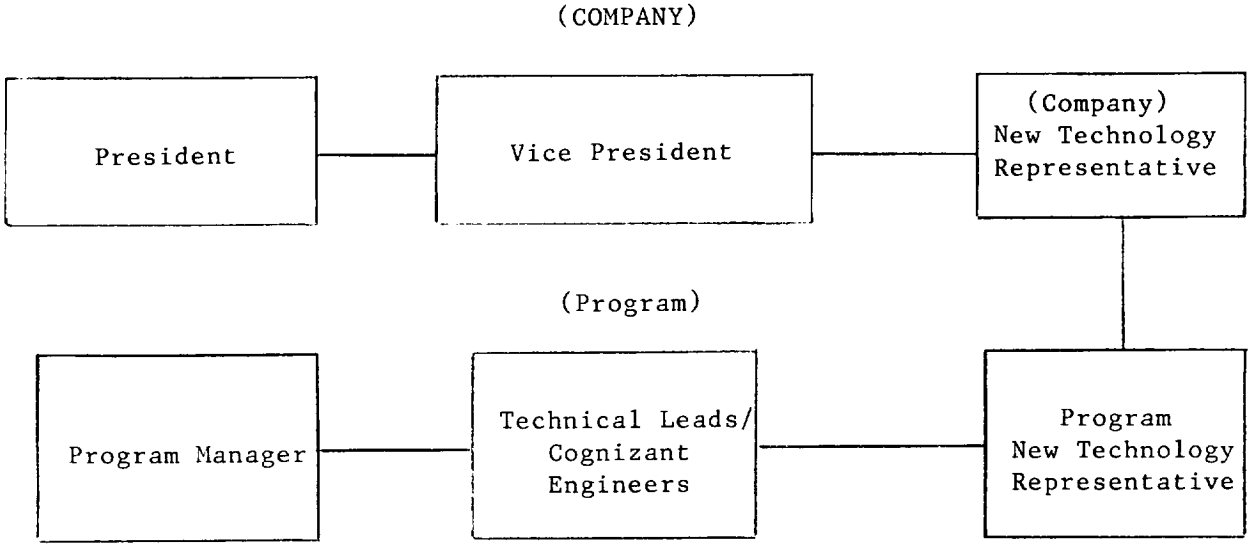


FIGURE 1 (Company) Organizational Responsibilities For New Technology Reporting

(name), the Systems Engineering Lead, will also serve as the Program New Technology Representative on the (program). He will be responsible for the technical, cost, and schedule performance for systems engineering efforts under this contract.

(Background)

EDUCATIONAL AND MOTIVATIONAL PROGRAMS

The key to successful new technology identification and documentation activity is effective indoctrination and motivation of program personnel. Continuing education programs are essential to achieve effective motivation.

At the beginning of the program, program management personnel will be briefed by the _____(company)_____ New Technology Representative on the requirements of the New Technology clause and reporting procedures used to fulfill ___(company)___'s responsibilities. The Program New Technology Representative will hold indoctrination meetings with each organizational segment of the program. At these meetings, he will explain the technology utilization program, the requirements of the New Technology clause, the method of reporting, and the benefits accrued from active participation in the program. Copies of Appendix C, which delineates the scope of the new technology reporting requirement, and of Appendix D, which describes the new technology motivation program, will be distributed at the meetings. The meetings will be held on a repetitive basis for subsequently assigned personnel and to reindoctrinate personnel already assigned.

The _____(company)_____ New Technology Representative maintains close liaison with the Program New Technology Representative on each NASA contract. In addition, an internal quarterly reminder is sent to all Program New Technology Representatives. The reminder requests confirmation that they have established procedures for reporting new technology and that they are continuing to indoctrinate their program personnel (see Appendix E).

Since our New Technology Program is administered separately from our invention reporting system, we emphasize that reportable items of new technology should include discoveries, innovations, and improvements, as well as inventions, whether or not patentable.

The (company) New Technology Evaluation Committee meets quarterly and gives monetary awards for the best New Technology disclosures submitted in a given period. Appropriate ceremonies are scheduled for the presentation of company and NASA awards to the originators of the New Technology disclosures. Awards are publicized in the news media and on bulletin boards throughout the company. In addition, outstanding contributors receive recognition at an annual dinner hosted by top management.

The effectiveness of these educational and motivational programs is judged on the basis of the quality and quantity of the New Technology reports submitted during a given period. A quality assessment of each report is made by the supervisor of the originator's organization segment, the Program New Technology Representative, the (company) New Technology Representative, the Patent Counsel, and the (company) New Technology Evaluation Committee prior to submittal to NASA. A quantitative assessment is based on the number of reports submitted against established goals in such major programs as _____. (company) management is furnished an annual report of all New Technology disclosures submitted to NASA. This report identifies those selected for awards.

IDENTIFICATION OF NEW TECHNOLOGY

A search system will be used to ensure early identification of reportable items. The key elements of the search system are identification of innovative personnel and identification of high-potential areas of innovation.

Program personnel are required to maintain laboratory notebooks or equivalent records and any other records that are necessary to document the conception and/or the first reduction to practice of reportable items (see Appendix F).

The Program New Technology Representative will establish and maintain a file of potential New Technology disclosures. This file will be used for frequent periodic follow-up reviews to assure that all reportable New Technology is documented and transmitted to NASA. The file will derived from:

1) Continuous personal contact at all working levels;
2) Reviews of studies, technical notes, and reports;
3) Attendance at design reviews;
4) Attendance at staff meetings;
5) Frequent visits to areas of work; and
6) Reviews of critical problem areas.

During development of the (program), the Program New Techology Representative will hold periodic technical meetings with the program leads. These internal meetings at (company) will be informal and, in general, will be held once per week. The primary purpose of the meetings will be to review (program) development status and problem areas. At these same meetings, however, program personnel will be queried for any items which should be disclosed under the NASA New Technology Program.

DOCUMENTATION OF NEW TECHNOLOGY

(company)'s New Technology Disclosure Form, (Appendix E), will be used for each reportable item. The form will be prepared by the innovator with assistance from the Program New Technology Representative, as necessary. The reports will contain enough detail and backup material to evaluate the item for technical quality, novelty, and potential usefulness. Unnecessary redocumentation will be avoided by enclosing existing documents or abstracts when appropriate.

A flow diagram of New Technology Disclosure Reports, Figure 2, displays the entire process from identificaion of a candidate innovation through transmittal of the report to NASA. The screening process reflected in this flow diagram

provides for a review by the originator's supervisor and the Program New Technology Representative, who sign the disclosure form, and subsequent reviews by the _____(company)_____ New Technology Representative, the Patent Counsel, and a final appraisal by the _____(company)_____ New Technology Evaluation Committee.

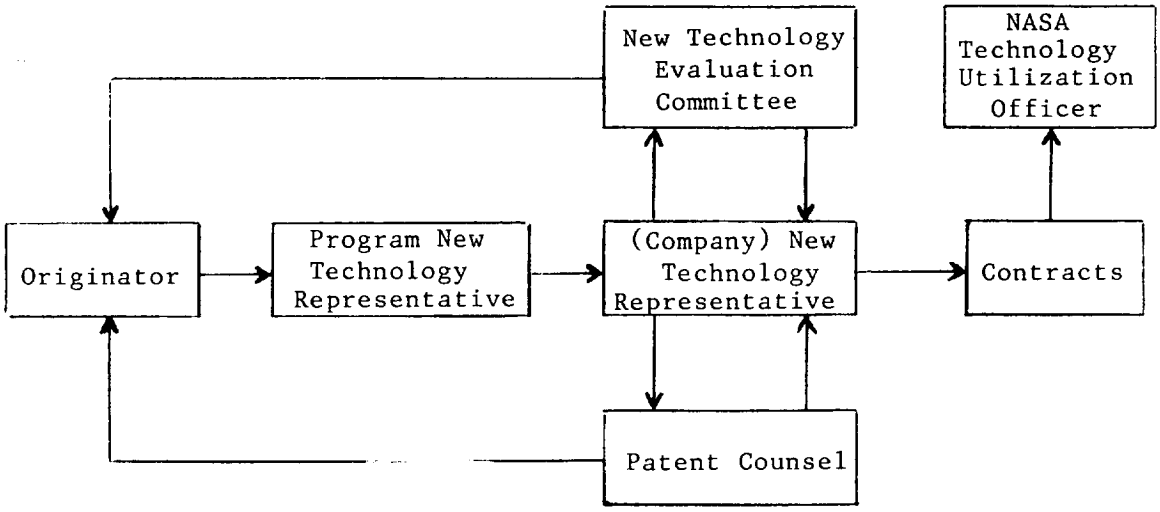


FIGURE 2 Flow of New Technology Disclosure Reports

LEVEL OF EFFORT

Costs associated with _____(name)_____ 's performance of the New Technology function do not warrant a separate breakout from his basic charge to the project. It is not anticipated that the requirement for periodic meetings with NASA new technology and patent personnel would be so extensive as to warrant a separate cost for this function.

At this time it is not feasible to establish a goal for submittal of new technology disclosures. However, as stated previously, we are committed to the prompt identification and reporting of all new technology as it is conceived or reduced to practice under this contract.

PERIODIC MEETINGS WITH NASA PERSONNEL

We concur with the desirability of periodic meetings of (company) new technology personnel with NASA new technology and patent personnel to assure an effective effort to maximize the return on new technology that may be conceived or reduced to practice. Attendance at such meetings of this nature would normally be restricted to the Program New Technology Representative. The (company) New Technology Representative and the Patent Counsel would attend the initial meeting or subsequent meetings, if NASA requests their presence. The subject of new technology will also be a formal topic during quarterly reviews, the preliminary design review, and the final delivery and acceptance test review.

SUBCONTRACTS

The New Technology Clause, modified to identify the parties thereunder, will be included in each subcontract with other than a small business firm or a nonprofit organization where the performance of experimental, developmental, research, design, or engineering work is contemplated. For subcontracts for experimental, developmental, research, design, or engineering work with a small business firm or nonprofit organization, the Patent Rights (Small Business Firm and Nonprofit Organization) Clause, suitably modified, will be used.

The NASA Technology Utilization Officer will be advised of all subcontracts containing the New Technology Clause. Data furnished will include the name of each subcontractor, a description of work to be performed, the date of award, and estimated completion date.

(COMPANY POLICY - NEW TECHNOLOGY PLANNING AND REPORTING
NASA PROGRAMS)

(COMPANY PROCEDURE - NEW TECHNOLOGY REPORTING)

NEW TECHNOLOGY REPORTING

The SPACE ACT of 1958 states that "NASA...shall provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."

NASA established a Technology Utilization Program to rapidly effect this transfer. Under this program, NASA contracts contain a New Technology Clause. This clause requires the contactor to actively

SEARCH
IDENTIFY
REPORT

all New Technology discovered during the performance of the contract, to benefit ALL the citizens of this country. Noncompliance can mean penalties to the company. Compliance can mean rewards for YOU.

YOU as a participant in a NASA program are required to report any

DISCOVERIES
IMPROVEMENTS
INNOVATIONS
INVENTIONS

CONCEIVED, DEVELOPED, OR REDUCED TO PRACTICE on the contract, whether patentable or not.

REPORTABLE ITEMS INCLUDE:

NEW OR IMPROVED

Apparatuses		Engineering
Applications		
Articles		
Circuits		Management
Compositions		
Computer Programs		
Concepts		Manufacturing
Devices		
Fixtures		
Machines	IN	Quality Assurance
Materials		
Methods		
Processes		Reliability
Products		
Scientific Data		
Systems		Science
Techniques		
Tools		
Training		Testing

WHEN TO REPORT

Report as soon as the IDEA is conceived or developed while the

IDEA IS FRESH
DATA ARE AVAILABLE

HOW TO REPORT NEW TECHNOLOGY

Fill out the New Technology Disclosure Form

CLEARLY
CONCISELY

so that it can be readily understood by a person unfamiliar with the idea. A sample copy of a completed New Technology Disclosure may be obtained from the office of your New Technology Representative.

Submit the disclosure to your Program New Technology Representative. It subsequently will be delivered to the (company) New Technology Representative, routed through the Legal Department for patent consideration, reviewed by the (company) New Technology Evaluation Committee, and forwarded to NASA.

POSSIBLE BENEFITS TO YOU

Recognition of your creative talent.
Professional evaluation of the merit of your innovation.
$100 to $500 award from (company) for IDEAS.
$150 to $1,500 for PATENTABLE ITEMS PLUS, if exploited commercially under a NASA waiver agreement, company may, at its sole discretion, share royalties with inventor.

$100 from NASA plus a commendation for IDEAS published as TECH BRIEFS.
$150 from NASA for INVENTIONS if patent application is filed.
Supplementary awards (thousands of dollars) from NASA for scientific or technical contributions of significant value.

FOR ADDITIONAL INFORMATION ON NASA NEW TECHNOLOGY, CONTACT YOUR PROGRAM NEW TECHNOLOGY REPRESENTATIVE, OR

(name), (company) New Technology Representative

NEW TECHNOLOGY PROGRAM

BACKGROUND: The Space Act of 1958 required that all new technology developed under the Space Program be transferred to the civilian economy. As a result, the New Technology Clause in each NASA contract (and subcontract) requires that we must report any invention, discovery, improvement, or innovation which is conceived or successfully built and tested under the contract or subcontract.

PROCEDURES:

1) (company) Policy TO-00-D1, New Technology Planning and Reporting - NASA Programs -- Emphasizes management support for the program.

2) Standard Procedure No. 5.7, New Technology Reporting -- Defines the program and assigns responsibilities within the company.

3) Standard Procedure No. 11.6, Maintenance of Engineering Notebooks -- Defines the engineering notebook system.

REPORTING RESPONSIBILITY: A Program New Technology Representative (who may be, and often is, the Program Manager) is designated on each NASA contract to assure compliance with the review and reporting procedures specified in Standard Procedure 5.7. He receives an indoctrination by the (company) New Technology Representative (name) and is required to stimulate the generation of new technology disclosures and to make frequent, periodic reviews of work in progress and completed work to verify that all reportable items have been submitted. The Program New Technology Representative is also responsible for submitting annual and final reports of new technology. In addition, we are required to report to NASA any subcontracts which have been awarded under the prime contract.

DENVER MOTIVATION PROGRAM: In support of NASA's technology utilization objective, (company) has established a New Technology Evaluation Committee, chaired by the (company) New Technology Representative. The committee reviews all new technology disclosures and selects the outstanding contributions for cash awards ($100 to $500 per innovator). Employees also receive letters of commendation and their achievements are publicized in the company newspaper and/or on bulletin boards. Award winners receive additional recognition at an annual dinner hosted by top management (e.g., 1983 award winners were invited to the Off-Site Honors Night held at the Fairmont Hotel).

NASA AWARDS: In order to inspire individual creativity and to stimulate the identification and documenting of inventions and discoveries, NASA has established awards for ideas of particular value in the technology utilization program:

1) NASA Tech Brief Award - $100 per innovator
2) Patent Application Filed - $150 per innovator
3) Supplementary awards (thousands of dollars) for scientific or technical contributions of significant value.

ELIGIBILITY: All (company) employees working in support of NASA programs are eligible to receive professional recognition.

ASSISTANCE: Innovations should be reported on New Technology Disclosure Form No. _____. Assistance in reporting and preparing innovations can be secured by contacting (name) , extension ____, (location) .

M E M O R A N D U M

TO: (Program New Technology Representative)

FROM: EXT: MAIL:

SUBJECT: NASA New Technology Reporting Requirements

RE: (NASA Contract)

- -

This is a reminder that you are responsible for complying with the New Technology Clause under your NASA contract. The clause requires frequent periodic reviews of the contract and that each reportable item discovered in such reviews be PROMPTLY reported.

Failure to comply with the above can result in withholding payment of fifty thousand dollars or five percent of the contract, whichever is less.

Therefore, in order to meet our contractual obligations, please complete the attached form on your NASA contract(s) covering activity during the past quarter, and return to me by _____.

You are also reminded that an annual report is due to NASA on each anniversary date of your contract, as well as a final report upon completion of contract work. In addition, we are required to report to the NASA Technology Utilization Office any subcontracts awarded for experimental, research, design, or engineering work under the prime contract.

Your cooperation is appreciated.

(name)
(company)
New Technology Representative

Attachment(s)

RETURN TO:

QUARTERLY NEW TECHNOLOGY REPORTING STATUS

CONTRACT _____

	YES	NO
1. I hereby certify that I have established and am maintaining procedures to document the conception and/or first actual reduction to practice of reportable items.	_____	_____
2. I am continuing to indoctrinate my project personnel about new technology reporting.	_____	_____
3. I further certify that I have reviewed the development under this program during the past quarter expressly for the purpose of reporting new technology items.	_____	_____

4. The following new technology has been discovered under this contract (also identify any new technology of any subcontractor that comes to your attention):

NEW TECHNOLOGY ITEMS	DATE SCHEDULED TO BE REPORTED
_____	_____
_____	_____
_____	_____
_____	_____

NOTE: Any questions relating to what technology is reportable should be directed to _____ (name & ext) _____.

If you have no new technology to report at this time, initial here: _____

5. List below any subcontracts awarded for experimental, research, design, or engineering work.

_____

_____

_____

6. COMMENTS: _____

_____

(Signed) _____

_____
Date

(COMPANY PROCEDURE - MAINTENANCE OF ENGINEERING NOTEBOOKS)

(company)
(address)

NEW TECHNOLOGY DISCLOSURE

REPORT NO.

CONTRACT NUMBER	NAME OF INNOVATOR	SOCIAL SECURITY NUMBER

TITLE

ABSTRACT

DETAILED DESCRIPTION

1. General purpose; improvement over prior methods, materials or devices; detailed technical description including drawings or sketches, or other documents; features believed to be new:

2. For reference drawings, specifications, technical reports, and test reports useful in the evaluation of this reported item, see attachments

3. Previous known publication of this reported item:

APPLICATIONS

Include known, contemplated, suggested, or possible applications. Emphasize industrial and other non-aerospace uses, in addition to the applications described in DETAILED DESCRIPTION (1.) above. Identify specific industries, processes or products in which the reportable item might find application or to which it might be related:

WHAT ARE POSSIBLE EXTENSIONS OF THE INNOVATION

DEGREE OF DEVELOPMENT

1. CHECK APPLICABLE STAGE:

- ☐ Concept only
- ☐ Development completed (prototype)
- ☐ Production

2. Did the item operate satisfactorily in the manner for which it was intended? ☐ Yes ☐ No

3. Is further development contemplated? ☐ Yes ☐ No

TECHNOLOGICAL SIGNIFICANCE

In relation to the present state of technology, this reportable item is considered to be a:

☐ Major improvement or breakthrough ☐ Substantial improvement ☐ Minor modification/ slight improvement

NAME OF INNOVATOR DATE	NAME OF SUPERVISOR OF INNOVATOR DATE	NEW TECHNOLOGY REPORTING ENGINEER DATE

APPENDIX G

PATENT POLICY PAPER

April 1985

PATENT POLICY AND ITS EFFECT ON TECHNOLOGY REPORTING[1]

by
Richard L. Chapman
Denver Research Institute
University of Denver

Introduction

For 20 years the U.S. government has been moving toward a uniform policy regarding patent rights to inventions made in the course of Federally sponsored research and development. Originally that policy favored public retention of the right to such patents. Consensus now exists that private ownership of such patents provides a stronger incentive to develop the invention and, hopefully, assure its fullest use. With this intent, the Patent and Trademark Amendments of 1980 (PL 96-517) gave to nonprofit organizations (including universities) and small businesses the right to elect title to inventions made while engaged in Federally funded research and development. By Presidential Memorandum this policy was extended in February 1983 to all organizations conducting R&D for the Federal government, to the extent not otherwise precluded by other legislation.[2]

This paper examines the effect of this policy on NASA's new technology reporting system which provides the underlying information base for much of NASA's Technology Utilization Program. The paper reviews applicable Federal policy over the last 20 years, compares the recent changes with NASA's traditional policy, and evaluates implications of these changes.

A Review of Federal Policy

The first effort to establish a general government patent policy was the Presidential Memorandum and Statement of Government Patent Policy issued by President Kennedy on October 10, 1963. This memorandum stated that, while

uniformity may not be possible or desirable, greater consistency was needed. The policy statement recognized that timely commercialization is an important factor in considering how best to protect the general public interest:

> This statement of policy seeks to protect the public interest by encouraging the Government to acquire the principal rights to inventions in situations where the nature of the work to be undertaken or the Government's past investment in the field of work favors full public access to resulting inventions. On the other hand, the policy recognizes that the public interest might also be served by according exclusive commercial rights to the contractor in situations where the contractor has an established nongovernmental commercial position and where there is greater likelihood that the invention would be worked and put into civilian use than would be the case if the invention were made more freely available.

As this policy statement indicates, there was considerable room for interpretation. It did, however, create a general presumption that patent rights should remain with the government, as a first option.

In 1971 President Nixon issued a Presidential Memorandum and Statement of Government Patent Policy which reiterated that a single policy would be inappropriate since circumstances among Federal agencies vary considerably. The major change from the 1963 policy statement was the "additional authority" given to heads of departments and agencies "to grant ownership or exclusive use to their contractors on inventions arising from Government funded research where it is deemed necessary to create an incentive for further development and marketing."[4]

The shift in policy favoring private ownership of patents was given further impetus by the 1978 report of the Advisory Subcommittee on Patent and Information Policy of the Advisory Committee on Industrial Innovation created by President Carter's Commerce Department. This group concluded that private ownership would encourage innovation and was, therefore, in the national interest.[5]

By 1980 Congress had become sufficiently convinced to enact this policy into Public Law 96-517. However, only nonprofit organizations and small business firms (as defined by the Small Business Administration) were given the right to elect to take title to inventions arising during Federally funded R&D.[6] On February 18, 1983, President Reagan issued a memorandum directing the heads of executive departments and agencies to extend this policy to all organizations.[7] The "Fact Sheet" accompanying this memorandum states that "[e]xperience has shown that, in most instances, allowing inventing organizations to retain title to inventions made with Federal support is the best incentive to obtain the risk capital necessary to develop technological innovations."[8]

Comparing NASA Patent Policy and PL 96-517

Section 305 of the National Aeronautics and Space Act of 1958 states that inventions made during work under a NASA contract become the exclusive property of the U.S. government unless this right is specifically waived by NASA.[9] This waiver option represented an apparent liberalization from atomic energy research policy under which government retention of ownership of inventions was virtually exclusive.[10] The implementing regulations for this waiver option stated that:

> Among the most important goals thereof are to provide incentives to foster inventiveness and encourage reporting of inventions made under NASA contracts, to provide for the widest practicable dissemination of new technology resulting from NASA's programs, and to encourage the expeditious development and adoption of this new technology for commercial purposes.

The general effect of Public Law 96-517 and the associated Presidential Memorandum has been to transfer the waiver option from NASA to its contractors. Organizations conducting R&D under a NASA contract no longer need the space agency's approval to take title to inventions resulting from their

work. However, they must take positive action by filing a disclosure notice, followed by notification to elect title.[12]

The new law also affects the time limits for reporting and patenting inventions. PL 96-517 requires disclosure of each invention to the appropriate Federal agency "within a reasonable time after it is made."[13] Recently issued Federal Acquisition Regulations (FAR) establish a procedure for implementing PL 96-517, including specific time requirements. Contractors will be required to disclose inventions to the appropriate Federal agency within two months after the invention has been reported to "contractor personnel responsible for patent matters."[14] Within twelve months of such disclosure, the contractor must decide whether to retain title. The contractor then has two years following election to file for a patent.

In comparison, NASA's new technology reporting procedures allowed six months from the time the invention was made until NASA was notified. Following notification, the contractor had up to six additional months to elect to take title and then another six months in which to file for patent.[15]

Thus, the new Federal Acquisition Regulations allow the contractor more time for invention disclosure and patent application than has NASA's new technology reporting procedure. Under FAR, no time limit is specified for reporting inventions to contractor patent personnel, and after this reporting, the contractor has up to three years to apply for a patent--as opposed to one year under past NASA practice.

Furthermore, FAR uses a more narrow definition of what must be reported. Only patentable inventions must be reported, whereas NASA has required reports on inventions, innovations, improvements and discoveries. The broader definition has enabled NASA to be informed about innovations (such as new software) which may not be patentable but could be important in other applications.[16]

Table 1 summarizes this comparison of new FAR procedures and NASA new technology reporting practices:

TABLE 1.
A COMPARISON OF INVENTION REPORTING AND
PATENTING PROCEDURES (FAR) WITH NASA NEW TECHNOLOGY REPORTING*

	from PL 96-517NASA	NASA New Technology Reporting
o What must be reported	patentable inventions	inventions, innovations, improvements, discoveries
o When reported:		
to contractor (internally)	unspecified	unspecified
to agency	within 2 mos after disclosure so contractor patent personnel	within 6 mos after invention
o When patent election made	within 12 mos after disclosure	within 6 mos after report
o When patent application made	within 2 years after election	within 6 mos after election

*Note: NASA's procurement regulations conform to recently issued FAR amendments covering PL 96-517 and the Presidential Memorandum. This table contrasts the systems.

Effects of PL 96-517

It is still too early to assess definitely the full impact of PL 96-517, which became effective in July 1981. The best measure would be a comparison of commercial applications of government sponsored inventions before and after July 1981. Tracing inventions from first reporting to commercial application is a process beyond the scope of this study, as sufficient time has not elapsed for such a longitudinal analysis. A related factor clouding currently available data is the lag between application and reporting. Indeed, many of the inventions reported after July 1981 may not yet be "elected" or had patents applied for. As a result, a comparison of applications for patent or

notification before and after July 1981 may tend to underestimate the number of applications ultimately occurring since the passage of PL 96-517.

Recognizing the shortcomings in data availability, one means of assessing the law's effect is to compare the number of times NASA contractors have elected title to inventions before and after July 1981. Although neither the FAR measures nor previous NASA regulations specify a time for reporting inventions to contractor personnel, one may assume that substantial lags are unlikely where the contractor recognizes potential commercial value. That is, if we assume that the time between invention and electing title is relatively brief, a comparison of the number of title elections reported provides a first approximation of the influence of the law.[17]

Within NASA, this comparison reveals that the policy change has been accompanied by a decline in title elections. During the two years prior to July 1981, individuals, small businesses, nonprofits and universities requested patent waivers on 22 inventions. During the first two years the law was in full effect, July 1981 through June 1983, NASA records reveal only two cases where these entities elected title to inventions made under NASA contract or grant.[18] (See Table 2.)

TABLE 2.
REQUESTS FOR WAIVER OF NASA PATENT RIGHTS, July 1979-June 1981, OR ELECTION OF PATENT TITLE, July 1981-June 1983--Organizations Under NASA Contract/Grant Subject to PL 96-517

Period	Individual or Small Business	Not For Profit	University	TOTAL
July 1979-June 1981	17	1	4	22
July 1981-June 1983	0	1	1	2

Is this decline from 22 to two the result of PL 96-517? It may well take another five to seven years to provide a fully satisfactory answer. It appears that PL 96-517 may have removed an incentive for reporting inventions to NASA. Prior to the law, obtaining a patent waiver from NASA was an essential step to acquiring title to the invention. With passage of the law, this step is by-passed. As a result, contractors no longer have this incentive to report inventions to NASA. Nevertheless, the contract still requires that innovations be reported, and the law still requires that inventions subject to patent be disclosed.

As part of this study, the Denver Research Institute contacted representatives from the General Counsel's offices of the National Science Foundation (NSF), the U.S. Department of Agriculture (USDA), and the Department of Health and Human Services (HHS). All three agencies apparently have experienced increases in reporting, although only two attributed the increase to PL 96-517.[20]

From 1982 to 1983 invention disclosures at NSF have climbed from an annual average of around 110 to 150. These disclosures are required of NSF contractors whether they plan to seek patents or not. Prior to passage of the law, NSF was lenient in granting patent waivers. It is not clear that the recent upswing in reporting can be attributed to PL 96-517.

At USDA and HHS, increases in reporting have been attributed to passage of the law. USDA has a policy of retaining agency rights to inventions. There, not more than one invention was reported per year prior to July 1981. Since the law has come into effect, 31 inventions have been reported for election to title. HHS reports that total inventions, including internal inventions by employees, have risen from around 300 per year to 500-600 per year.

None of these three agencies--NSF, USDA, or HHS--is comparable to NASA in terms of its clientele who conduct research under contract or grant. (See Attachment 1, Federal Obligations for Total Research and Development, By Agency and Performer: Fiscal Year 1983.) Nearly all of the extramural research and development programs of these three agencies are conducted in universities or other not-for-profit institutions, whereas 62 percent of NASA's extramural research and development is conducted by industrial firms.

Based on an admittedly nonspecific set of data, it appears that invention reporting has increased since passage of PL 96-517. The NASA experience with title elections is an exception to this. No data have been made available which illustrate the law's effect on commercialization of new technologies or innovation in general. The correlation between innovation, reporting, and commercialization is not proven and, therefore, it is not safe to assume that increases in one area correspond to increases in the others.

Data on New Technology Reporting

Although the relationship between patent law/procedures and NASA's New Technology Reporting Program has yet to be fully correlated statistically, the basic trend of new technology reporting to NASA is down during the period that PL 96-517 has been in effect. The total decline amounted to nearly 20 percent. (See Table 3.)

TABLE 3.
REPORTABLE NEW TECHNOLOGY ITEMS RECEIVED, CONTRACTOR AND IN-HOUSE

NASA Field Center	July 1979-June 1981	July 1981-June 1983
Marshall	643	388
Lewis	304	289
Langley	732	583
Kennedy	56	80
Johnson	654	495
JPL	723	547
Goddard	189	133
Ames	98	235
TOTALS	3,399	2,750

Another indicator of technology reporting activity is the number of requests received by NASA Field Centers for Technical Support Packages (TSPs). TSPs are the more detailed, technical back-up descriptions prepared for each "tech brief" that is published in Tech Briefs. Their purpose is to provide sufficiently detailed engineering/scientific information so that potential users can make an informed judgment about the desirability of further investigation of the item. TSPs are mailed to those who request them, usually on the basis of returning a reader interest card enclosed in the issue of Tech Briefs that contains the abstract of the particular technology. Since the "tech briefs" are derived from new technology items reported by NASA in-house laboratories and contractors, they represent a delayed measure of technology reporting--based upon the user's perspective. Table 4 shows the same time periods--two years before and two years following the effective date of PL 96-517. In addition, the third column shows the second full year when the new law was in effect.

TABLE 4.
REQUESTS FOR TECHNICAL SUPPORT PACKAGES

Field Center	July 1979-June 1981	July 1981-June 1983	July 1982-June 1983
Marshall	297,853	66,587	15,007
Lewis	7,589	2,440	559
Langley	24,334	9,780	5,018
Kennedy	3,424	1,585	396
Johnson	21,298	13,870	7,639
JPL	60,835	32,391	13,770
Goddard	6,960	6,467	1,575
Ames	6,975	5,864	2,753
TOTAL	429,268	138,984	46,717

There has been a dramatic decline in TSP requests, from before to after the law's effective date, and an even more dramatic fall-off the second year--a further decline of nearly 51 percent from the previous year (July 1981-June 1982). These data suggest that the climate for reporting new technology within the NASA system has deteriorated, possibly because of the lack of incentives or leverage to stimulate it. They also suggest that what was reported proved to be of less interest to potential users as there were far fewer requests.

Conclusion

Some conclusions are straightforward. Federal policy, which once supported public ownership, now favors private rights to inventions made under Federal sponsorship. The law embodying this shift is less stringent (or complete) in reporting requirements than previous NASA policy. Time limits

for reporting inventions and applying for patents have been extended. The definition of reportable items has been narrowed. Since passage of the law, fewer title elections have been reported to NASA, though invention reporting at several other agencies primarily catering to university-based research and development has increased. New technology reporting to NASA has fallen substantially. Is it significant that neither of the contractors electing title to NASA-sponsored inventions in the two-year period July 1981-June 1983 was a small business? In the two years prior to July 1981, 17 individuals or small businesses requested patent waivers.

Other conclusions are more speculative. The law may be responsible for the decline in both patent and new technology reporting at NASA, perhaps because it relaxed reporting standards and removed an incentive to report. Other factors could influence invention reporting. What correlation is there between the type of work done and the number of inventions reported? Are some technical endeavors more prone to lead to inventions than others? Could changes in endeavor from year to year--not to mention the volume of activity--lead to changes in the number of inventions reported? Also, how do the policies and practices of contractors influence reporting? Some contractors are more assiduous in their reporting than others.

There remain too many unanswered questions to be able to assure that the recent changes (PL 96-517 and the Presidential Memorandum), in conjunction with proposed changes (such as S.64) will not adversely affect NASA's new technology reporting efforts. Indeed, what early data are available suggest substantial negative impact. Before postulating recommended avenues for action, it is useful to recapitulate those elements of the new patent policy which undermine new technology reporting in NASA, and to assess why they appear to have that effect.

First, PL 96-517 and the proposed extension via S.64 repeal Section 305 of the National Aeronautics and Space Act of 1958 which provides the basis for new technology reporting. This charter legislation was worded to expand what new technology was to be reported beyond that typically covered in traditional patent matters. Since the revised legislation (PL 96-517 and the proposed S.64) is directed at patent policy, broader concerns of new technology reporting are basically ignored, yet its basis in legislative authority is removed. This clearly weakens NASA's leverage to obtain the kind of new technology reporting that has been the foundation of NASA's Technology Utilization program.

Second, the more limited definition of what is to be reported (innovations that are patentable) provides no basis for an agency to require broader technology reporting and thereby substantially reduces reporting. A significant number of applications from NASA's Technology Utilization program have involved non-patentable applications such as management practices, computer software, or incremental modifications of processes or procedures. For example, a review of all new technology items published in NASA Tech Briefs, Volumes 5-8 (1981-84) show that 68.6% represent items not patented; when restricted to items reported only by contractors, that ratio rises to 78.9%. See Table 5, below. Only the organized efforts of the Technology Utilization program, of which new technology reporting is a key element, provide a broad awareness of such technology that otherwise would not come to the attention of widely diverse potential users.

TABLE 5.
NEW TECHNOLOGY ITEMS PUBLISHED
IN NASA TECH BRIEFS, VOLUME 5-8
(1981-1984)

Source	New Technology Items Published		
	Patented	Not Patented	Total
In-house	275	170	445
Contractor	280	1045	1325
Total	555	1215	1770

Third, the time limits for reporting by contractors under the recently promulgated Federal Acquisition Regulations permit up to three times as long from reporting to patent action. First disclosure by the contractor to the agency may be delayed for an undetermined period until the contractor officer responsible for patents is officially notified. This creates a circumstance in which substantial delay can occur in making the broader community of potential users aware of an innovation. In addition, defensive behavior by contractors is encouraged whereby innovations considered marginal by the contractor remain unreported to prevent unforseen benefits to potential competitors. That is, there would be neither incentive nor leverage from the agencies to stimulate such reporting and, thereby, greater awareness. It should be noted that this problem is not as acute for agencies such as the National Science Foundation, the Department of Health and Human Services, or the U.S. Department of Agriculture where the research clientele consists primarly of universities and affiliated not-for-profit groups. They do not feel the same power of economic competition as do the bulk of NASA research and development contractors.

In summary, although the data available are fragmentary and far from definitive, when combined with nearly 20 years of technology utilization

experience and the logical impact on NASA of the implementing regulations for the new patent policy, the overall effect is to undermine the new technology reporting process and, thereby, weaken NASA's Technology Utilization program.

Avenues For Action

Consideration of the various options for the action that NASA officials might take to avoid damage to their new technology reporting system must be assessed within the context of the administrative and political "climate" within which these issues are embedded. Irrespective of what action NASA officials elect to take, a fundamental tenet needs to be made forcefully at the outset: the principal goal of recent and proposed patent law change is the same as that of NASA's new technology reporting system namely, the timely and effective commercialization stemming from Federally-sponsored/conducted research and development. The fact that this goal has been at the center of NASA's new technology reporting and technology utilization systems for over 20 years, and has been pursued with reasonable success, should earn NASA a reasonably unbiased hearing as the issue is dealt with by higher political levels in both the Administration and the Congress.

Another factor needs to be emphasized: although consistency has its value, the drive for uniformity across Federal agencies with respect to patent practices tends to ignore important variations which are necessary to viable and productive programs--in this case the Technology Utilization program. Three factors seem to have been given insufficient attention in the process of both legislative consideration, and in interagency efforts to arrive at subsequent regulatory framework. The first two are assumptions which seem to be reasonable, but which are not supported by actual experience: (1) that industry aggressively pursues all/most "good" innovations and (2) that the innovator is the best judge of an invention's potential. The third is the apparent

lack of consideration given to the detrimental impact on NASA's new technology reporting system and its subsequent impact on technology utilization and technology transfer. The third item has been dealt with above so a few words are in order on the two assumptions.

The extensive literature on how innovation flourishes and is brought to commercialization is replete with instances where companies have turned their backs on innovators within their respective organizations, sometimes leaving to competitors or others to capitalize on such decisions. However, what is true and pertinent to the administration of patent policy is that the exclusive use of an invention is more apt to stimulate its development through incentives and more favorable terms for financing than if the invention is acquired on a nonexclusive basis. In this sense, the private sector is the more likely candidate for exploitation of innovation. But the blanket transfer of patent rights to the private sector in no way assures commercialization.

The general thrust of the new patent policy assumes that the initiator (individual or institution) of an idea is best placed to assess its potential, and to act upon it. Again, the history of innovation and experience in NASA's Technology Utilization program does not bear this out. Often, the individual or institution where a new idea is first generated (and perhaps even applied) is either not motivated or is unable to perceive how such an innovation might be applied in totally different institutional or substantive applications. Therefore, the means by which to best assure widest possible application is to make that information available as broadly as possible. This program of awareness does not necessarily have to intrude on the rights of the inventor or patent rights holders. These are reasonably safeguarded under the new technology reporting system even as it provides a wide opportunity to broadcast the existence of the innovation.

Finally, it needs to be emphasized that NASA's new technology reporting system, even under the best of circumstances, is somewhat fragile. It cannot work effectively as an automatic, mechanical reporting system. It is most effective where a sense of personal responsibility is exhibited by both contractor officials and NASA contract monitors. It depends a great deal upon an informal network of personal association and communications. However, with rare exception, these networks are most unlikely to be established if there is no formal requirement for such in the contract instrument.

In summary, the general administrative/political climate in which NASA must seek some "relief" from the general direction of current patent policy is one in which there is a strong consensus for shifting patent ownership to the private sector. This policy reflects NASA's general practice, and both the new legislation and NASA policy share the common goal of stimulating the timely commercialization of innovations growing out of Federally sponsored research and development. However, in the process little serious consideration has been given, outside of NASA, for the unintended impact on NASA's new technology reporting system--possibly as a result of an incomplete understanding of the breadth of that system or a less than full appreciation of the complexity of the innovative process.

In light of this "climate," NASA appears to have three options, which could be pursued independently or in conjunction with one another:

(1) supplement and expand current efforts to obtain relief by modification in the Federal Acquisition Regulations or through an exemption produced in legislation, possibly through one of NASA's authorization committees in either the House or the Senate;

(2) concentrate efforts to preserve Section 305(b) in various legislative versions of new patent legislation (such as S.64 in order to retain the statutory basis for new technology reporting; and

(3) accept the potential loss of authority in Section 305 of the National Aeronautics and Space Act of 1958 and shift the statutory basis for new technology reporting to Section 203(a)(3) which is the basis for the Technology Utilization program, retaining the technology reporting regulations and contract language as it has been prior to the issuance of the Federal Acquisition Regulation changes.

Each of these options has important risks attached to it--some of an inherent nature, and others depending upon how the administrative/political climate is at the particular time action is initiated. The following is a brief assessment of the pros and cons on each.

Until the Administrator has been brought in to deal aggressively with this issue, it cannot be considered to be beyond the reach of administrative settlement. However, this assumes that the Administrator judges the issue to be worthy of significant attention and time, and that the point in the development of the issue has not been passed where his strong involvement can be used to best advantage. Clearly, NASA has a "good" case for having some relief, perhaps in terms of an exception to the rules issued under the most recent edition of the FAR. A statutory exclusion would be more effective, but obviously more difficult to obtain. Sympathetic action from NASA's authorizing committees is a potential opportunity, but must be assessed in view of other legislative priorities. The key questions here are: (1) should the

Administrator be involved personally and to what extent, and (2) when is the best time for such involvement?

Given the fact that the administration is solidly behind the extension of PL 96-517 through such legislative instruments as S.64 (although it is not investing a great deal of political capital), efforts to save the totality of Section 305 of the National Aeronautics and Space Act of 1958 may be more than one can reasonably expect. Legislative action as of early April 1985 strongly suggests that there is little apparent opposition to prevent eventual enactment of S.64 in some version. Therefore, the most likely route to preserve NASA's new technology reporting system is to demonstrate the need for some modest amendment and seek the legislative assistance neccesslogy reporting system is to demonstrate the need for some modest amendment and seek the legislative assistance neccessary to accomplish this. This could be met by the simple amendment of Section 206 in S.64 so that Subsection 305(b) of the National Aeronautics and Space Act of 1958 is excluded from the repealing authorization.

Another avenue to accomplish this same purpose would be, through one or both NASA authorizing committees, to exclude Section 305(b) from such repeal, assuming such legislation had passed. This option would shift the scene of discussion from the Administration setting to that of the Congress, where it might receive a somewhat different hearing, given the cast of principal actors. The same arguments would be valid in support of NASA's position as in the first option, but they could easily appear in a context where the requested change appears to be substantially less.

Finally, if both options one and two are unsuccessful, or in the instance where NASA officials conclude that either option involves unacceptable levels of political conflict, there is a strong rationale for continuing the new technology reporting requirements more or less intact but citing Section

203(a)(3) as the statutory basis for this type of reporting. Since new technology reporting always has been broader than reporting purely for patent matter considerations, and since this section provides the basis for the Technology Utilization program which depends so much upon new technology reporting, such a shift would have solid basis in both logic and practice. It appears, in retrospect, that Section 305 is the general statutory basis principally because of the subsection (b) being located there as a traditional administrative convenience in relating to contracting and patent matters. A good argument could be made that NASA continue its new technology reporting system and requirements in both regulations and contract language, including the penalty for withholding payments under such authority, and that such authority is rightfully exercised because of the substantive relationship between new technology reporting as a principal underpinning of the Technology Utilization program. This will not deter really agressive opponents from challenging the authority, merely because NASA has had somewhat different practice over the past 20 years. Conceivably, a contractor could claim that the "new" system was operationally in conflict with patent law (if something similar to S.64 became law). Presumably, the argument would be that disclosure under new technology reporting would be detrimental to the company or inhibit <u>its</u> successful commercialization of an innovation, perhaps by being forced into a hurried decision regarding patenting. The legal ramifications need to be examined. However, NASA's handling of the new technology reporting function over the past 20 years has been done in a fashion which strongly demonstrates its ability to avoid such conflicts, including the unwanted disclosure of proprietary information or industrial secrets. Ostensibly, the burden of proof would be on the plaintiff to demonstrate that NASA would be unable to fairly and effectively administer the new technology reporting

system under the new patent policy. In one sense, this latter option is the "easiest" since it would avoid an immediate political confrontation. It would also delay such a confrontation although once the policy was established it probably would be challenged by the Department of Commerce as well as one or more contractors.

Of course, NASA can take no action whatever on one of two assumptions: (1) that the preliminary data which show a drop in patent waivers/election to title is a momentary aberration and will shortly be reversed, or that the drop off in new technology items reported is totally unrelated to the climate created by PL 96-517 and considerations of extension of that legislative policy; or (2) that the new technology reporting system, even though it might be substantially undermined, is not of sufficient value to make a significant effort at retaining a relatively high level of activity. The latter would presume some substitute means for accessing new technology development by contractors, and would presume a shift in the structure and emphasis of how technology transfer is to be accomplished, or would consider a formal, organized Technology Utilization program in NASA as no longer needed.

FOOTNOTES

1. Data collection and early portions of this paper were contributed by Dr. Lawrence J. MacDonnell currently Director, National Resources Law Center, University of Colorado, and by Mr. Joel Johnson, Strategic Planning Staff, American Broadcasting Company.

2. Memorandum and Statement of Government Patent Policy issued by President Ronald Reagan February 18, 1983. Hearings have been held in the U.S. Senate Judiciary Committee on S.2171 to provide a statutory base for this policy.

3. Memorandum and Statement of Government Patent Policy issued by President John F. Kennedy October 10, 1963.

4. Memorandum and Statement on Government Patent Policy, issued by President Nixon on August 23, 1971.

5. Draft Report of the Advisory Subcommittee on Patent and Information Policy of the Advisory Committee on Industrial Innovations established as part of the Domestic Policy Review, December 20, 1978.

6. PL 96-517

7. Op. cit.

8. Ibid.

9. Note: NASA policy currently reflects both PL 96-517 and the Presidential Memorandum and Statement of February 18, 1983.

10. This AEC policy related principally to all research and development on atomic energy; observers indicate that other research sponsored by AEC was less restricted in terms of patent and license practice.

11. 14 CFR 1245.103.

12. Note: NASA may "reserve" retention of patent rights under certain circumstances, e.g., where an invention is critical to advances in aerospace technology that requires broad use for public benefit.

13. 202(c)(1).

14. Implementing regulations to date are to be found in recently consolidated Federal Acquisition Regulations; for example, 48CFC Ch. 1, Federal Acquisition Regulations; Final Rule, 52.227-11 Patent Rights Retention by the Contractor (short form) as published in Federal Register, Vol. 49, No. 63 (March 30, 1984), p. 12969 ff.

15. Interim Patent Waiver Regulation Amendments to 14CFR1245.1 of July 1981, Federal Register, Volume 48, Number 96, pp. 22132-22133.

16. An item may be "subject to patent" but not legally patentable because of prior publication or some other bar. Therefore, one can draw a legal distinction between an innovation that substantially qualifies for patent, but fails to meet other requirements. NASA's new technology reporting also includes improvements that are clearly not patentable, e.g., software and management/business techniques.

17. Note: Anecdotal evidence from interviews in NASA Field Centers suggests that contractors may not be fully sensitive to potential commercial applications.

18. Beginning July 1981 the measure used for comparative purposes is the number of times small entities reported taking title to inventions. Not all contracts were updated immediately to include the new clause, but request for waivers from organizations affected by PL 96-517 would be accorded the same treatment as if the clause were included.

19. Data on applications for patent waivers were compiled from the docket cards of the Inventions and Contributions Board at NASA. The data exclude: (1) applications by businesses listed in Dun & Bradstreet as exceeding 500 employees or $10 million in sales, (2) applications by the California Institute of Technology, which include applications by the Jet Propulsion Lab (JPL), (3) voided applications, and 4) applications for advanced waivers, which are blanket waivers not specific to a particular invention.

20. Discussions by Joel Johnson, DRI, with Ms. Lucy Petit, General Counsel's Office, National Science Foundation and by Richard Chapman with Howard Silverstein, General Counsel's Office, U.S. Department of Agriculture; and LeRoy Randall, General Counsel's Office, U.S. Department of Health and Human Services; April 4, 1985.

21. From quarterly reports, NASA Technology Utilization Report, NASA Form 1484; data re-cast for comparison of two year period before and after PL 96-517 went into effect (i.e., July 1979-June 1981 and July 1981-June 1983).

22. Ibid.